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## CONTENTS.

Proximate Analysis of Stigmata Maydis. By C. J. Rademaker, M. D., and John L. Fischer, Ph. G.	360	On Commercial Sulphate of Quinine. By J. M. M.	369
Investigation of the Mark of Fraxinus Americana. Lis.	370	The Kola Nut and its Action. By Watson Smith, F. C. S., F. I. C.	361
Polygonum Hydropiper. By C. J. Rademaker, M. D.	373	Constituents of Lobelia. By Hermann von Rosen, M. D.	363
Abstracts from Italian Journals. By Jos. W. Engländer, Ph. G.	377	Examination of the So-Called Spruce-Gum. By Adolph F. Menges.	364
Gleanings from Foreign Journals. By George H. Oshea, Ph. G.	380	Insects and Flowers: A Question, By C. E. Meeker.	366
Contact Actions. By D. Mendelejeff.	381	On Strophanthus, A Heart-Poison. By J. M. M.	368
Paraquinazolid and Derivatives. By Z. H. Straup.	383	Gleanings in Materia Medica. By the Editor.	367
Hydroquinone and Arbutin. By Hugo Laurents, M. D.	385	Apprentice Examinations. By Wallace Procter.	370
On the Occurrence of Pepsin and Trypsin in Normal Human Urine.	387	Minutes of the College Meeting.	373
Preparation of Kafir and Koumis. By Dr. Bogelmann, of Graz.	388	Editorial.	375
		Reviews and Bibliographical Notices.	378
		Obituary.	380

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This Journal is devoted to the advancement of PHARMACEUTICAL KNOWLEDGE and to the advocacy of a MORE THOROUGH EDUCATION and PRACTICAL TRAINING for all persons engaged in PREPARING and DISPENSING medicines, drugs and chemicals.

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(Incorporated 1859.)

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# THE AMERICAN JOURNAL OF PHARMACY.

AUGUST, 1886.

## PROXIMATE ANALYSIS OF STIGMATA MAYDIS.

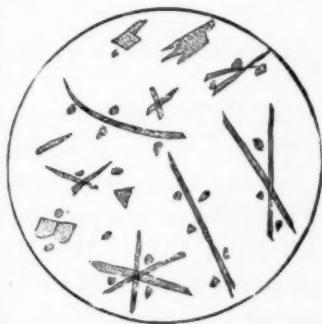
By C. J. RADEMAKER, M.D., AND JOHN L. FISCHER, Ph.G.

Fifty grams of stigmata maydis were treated with petroleum spirit at a boiling point below  $112^{\circ}$  F. This extracted 5.25 per cent. of a light yellow fixed oil which saponified readily with caustic potash, and solidified at a temperature of  $50^{\circ}$  F. No volatile oil was found in the petroleum extract, nor was any obtained by distillation. The oil was soluble in chlorform, ether and petroleum spirit, but was insoluble in alcohol. The action of nitrous acid upon this oil produced no change of color, but the oil solidified in a few hours.

The drug after drying was next exhausted with ether, this extracted 2.25 per cent. of solid matter; one (1) per cent. of this was soluble in water. This aqueous solution had an acid reaction, the other 1.25 per cent. proved to be resin and chlorophyll. Upon evaporating the aqueous solution to dryness, redissolving the residue in ether and allowing the ether to evaporate spontaneously, a colorless acid crystalline principle was left.

The original drug after being dried was then treated with absolute alcohol; this extracted 3.25 per cent. of solid matter, 2 per cent. of this proved to be resin and coloring matter, the other 1.25 per cent. proved to be an acid, identical with the acid found in the ether extract.

This acid was first discovered by Dr. Vautier (*Arch. Méd. Belges*), and he named it *maizenic acid*. It is freely soluble in water, ether and alcohol, but insoluble in petroleum spirit. It decomposes the alkaline carbonates, and its salts are crystallizable, the potash salt crystallizing in rhomboidal prisms.



MAIZENIC ACID X700.

To water the drug yielded 19.50 per cent. of solid matter. This was redissolved in water and then made alkaline by caustic potash. The solution was then successively treated (agitated) with ether, chloroform and petroleum spirit, but no crystalline principle was obtained. The aqueous extract consists principally of sugar, gum and extractive matter.

That portion of the drug that was insoluble in water, gave to a 2 per cent. solution of caustic soda, 3.50 per cent. of solid matter, consisting of albuminoids, phlobaphene, etc., and to a 2 per cent. solution of hydrochloric acid, the drug gave 5.50 per cent. of salts with a small amount of extractive matter.

Upon bleaching the final residue, washing and drying, 37 per cent. of cellulose was obtained.

Another portion of the drug yielded 20 per cent. of moisture. The following shows the amount of the most important constituents:

Fixed oil.....	5.25	petroleum spirit extract.
Resin, crystalline principle and chlorophyll....	2.25	ether extract.
Resin, crystalline principle and chlorophyll....	3.25	alcohol extract.
Sugar, gum and extractive.....	19.50	water extract.
Albuminoids, phlobaphene, etc .....	3.50	from alkaline solution.
Salts and extractive.....	5.50	from acid solution.
Cellulose .....	37.00	
Water.....	20.00	

---

96.25

LOUISVILLE, JULY 4, 1886.

### INVESTIGATIONS OF THE BARK OF FRAXINUS AMERICANA, LIN.

In 1882 Howard M. Edwards reported having obtained evidence of the presence of an alkaloid in the bark of the American white ash (*AM. JOUR. PHAR.*, 1882 pp. 99 and 283). A further examination of this principle has been made during the past year, and two theses were presented last winter to the Philadelphia College of Pharmacy, from which the following brief abstracts are made:

George W. J. Hoffman, Ph.G., used for his experiments the trunk bark, deprived of the suberous layer. A decoction was made of 24 troy ounces of the bark with water acidulated with hydrochloric acid; milk of lime afforded a light green precipitate, which was washed, dried and powdered; it yielded nothing to hot alcohol or ether. On treating with diluted alcohol, acidulating the filtrate with sulphuric acid, treating with animal charcoal and evaporating, a few



light brownish crystals were obtained, containing calcium sulphate and giving very slight reactions with Mayer's reagent and with solution of iodine. By precipitating the filtrate from the lime precipitate with tannin, and decomposing with sulphuric acid, a calcium salt was obtained, but no indications of an alkaloid.

A tincture was made with 20 per cent. alcohol, and evaporated; the residue treated with strong alcohol left a gummy matter behind, the filtrate was concentrated, mixed with water, and tested with tannin, iodine and picric acid, which did not affect the clear liquid; but Mayer's reagent gave a faint cloudiness. On precipitating the liquid with lead acetate and freeing the filtrate from lead, it was free from bitterness, yielded no reaction with the usual reagents for alkaloids, and no alkaloid could be obtained from it.

A tincture made with 15 per cent. alcohol gave results similar to the preceding. On treating the precipitate by lead acetate with ether, and evaporating the latter, a yellowish, apparently crystalline residue was obtained, which was soluble in alcohol and water and had the odor and taste of the drug.

A tincture made with strong alcohol was concentrated, mixed with water, which precipitated a light-colored resin, and the filtrate variously treated without yielding an alkaloid. It was noticed that ferric chloride caused a coloration similar to that produced by gallic acid; and that nitric acid in excess caused a blood red color both in aqueous and alcoholic solutions.

The bark collected by the author showed the same behavior as the commercial bark.

Daniel W. Cahill, Ph.G., collected a quantity of the root bark and stem bark, which were deprived of the corky layers and analyzed according to the plan of Dragendorff, with the following results:

	Root Bark.	Trunk Bark.
Organic matter extracted by petroleum benzin.....	60	20
"        "        "        " strong ether.....	36	36
"        "        "        " absolute alcohol.....	14.68	11.00
"        "        "        " water.....	10.33	9.14
"        "        "        " dilute alkali.....	89	.83
"        "        "        " dilute acid.....	4.20	2.16
Loss by bleaching.....	3.26	2.91
Moisture.....	6.76	7.23
Ash.....	5.92	5.40
Residue.....	45.95	56.09
Loss.....	7.05	4.68

The benzin extract consisted of wax, and in that of the root bark a little volatile oil was found. The resinous ether extract communicated to water a yellowish color and a bitter taste. More of the bitter principle was found in the alcoholic extract, the aqueous solution of which did not reduce Fehling's solution, yielded a white precipitate with tannin, reduced gold from the chloride, gave with phosphomolybdic acid a dark blue-green color and yellowish white precipitate, and was not disturbed by potassio-mercuric iodide, platinic chloride, or picric acid. The extract treated with potassa gave off ammonia. The aqueous solution rendered alkaline was shaken with chloroform, the latter evaporated, the residue dissolved in water, and this solution evaporated over sulphuric acid. The residue was crystalline, very bitter, and dissolved in hydrochloric acid without color, in nitric acid with a light yellow color, and slowly in sulphuric acid with a brownish red color, changing to dark purplish brown on heating. The resinous residue of the alcoholic extract still imparted to water a light yellowish color, changing to dark brown by alkali, and to yellowish again when acidulated.

The aqueous extract of the bark contained glucose and was free from tannin. The alcoholic extract of the bark represents the medicinal virtues.

An analysis of the trunk bark (it seems that the corky layer was not removed) was made at the University of Wisconsin, by Edw. Kremers. (Contributions from the Department of Pharmacy, Univ. Wis., 1886, p. 19-26.) The distillate with water showed traces of volatile oil. The distillate with potassa gave no reaction for a volatile alkaloid; the liquid in the flask attracted attention by its intense greenish-blue fluorescence. The infusion with acidulated water afforded precipitates with iodine and with potassio-mercuric iodide; likewise after precipitating with ammonia, filtering and acidulating, and also the ether residue from the alkaline liquid. Similar results were obtained after mixing the bark with lime and extracting with alcohol. Petroleum benzin extracted from the bark 0.52 per cent. of yellow fatty matter of the consistence of lard; and ether afterwards took up 2.08 per cent. of a soft resinous substance.

By a process similar to that of Salm-Horstmar for fraxin the precipitate with basic lead acetate yielded an amorphous glucoside readily soluble in water and alcohol, showing a strong blue fluorescence in alkaline, but not in acid solutions, and on boiling with dilute hydrochloric acid yielding sugar and an amorphous principle closely related

to fraxetin. The filtrate from the lead precipitate, freed from lead, contained sugar, and tannin precipitated from it a small amount of amorphous bitter principle. The bark exhausted with alcohol, was treated with hot water; this liquid contained gummy matter and mannite.

The tincture obtained with hot alcohol from 250 gm. of bark dried with milk of lime, was concentrated, acidulated with sulphuric acid, the liquid filtered, made alkaline with ammonia and shaken with ether. The ether residue on being taken up with acidulated water gave reactions with iodine and potassio-mercuric iodide; and on being evaporated spontaneously yielded crystals, which were freed from an amorphous dark colored mass, and were then almost insoluble in cold alcohol or water, but separated from the hot solution in slender needles, which are slightly acrid, neutral, melting at  $166^{\circ}$  C., soluble in ether and with a yellow color in ammonia, the latter solution becoming colorless with hydrochloric acid and gradually assuming a purplish tint. These crystals are probably *fraxetin*. Treatment of the alkaline solution with chloroform gave a dark purplish solution from which more of the crystals could be obtained, also solutions giving alkaloidal precipitates.

The precipitate with lead acetate from a tincture of the bark contained a soft substance of a somewhat resinous nature, which was partly soluble in hot water, the solution giving reactions with alkaloidal reagents.

All the above experiments render the existence of an alkaloid in white ash bark more than doubtful, without throwing much light upon the bitter principle. Mr. Kremers' results indicate a probable relation of at least one constituent to fraxin and fraxetin; but these principles as obtained from the barks of the European ash and of the horse chestnut are still very imperfectly known.

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## POLYGONUM HYDROPIPER.

By C. J. RADEMAKER, M. D.

That the active principle of this drug, which I first described in the AMERICAN JOURNAL OF PHARMACY, November, 1871, is neither gallic nor tannic acid, as was stated by Messrs. H. Trimble and H. J. Schuchard, I think I have proven beyond a doubt (see this JOURNAL, June, 1886, p. 279). In the July number, p. 356 of this JOURNAL, I see that the gentlemen are considerably agitated over my criticism of their article, that they cannot resist the temptation of

calling attention to several statements, to which I shall respond with the greatest of pleasure.

Ad 1 and 2.—If I did not question that part of their paper referred to, the reason was that I overlooked it. But let me state here, that if my process or processes are minutely followed, no tannic acid can be separated in sufficient quantity to produce a precipitate with gelatin. (I do not mean to state that smart-weed contains no tannic acid.) If my article of 1871 is carefully read, it will be seen that this acid, after being separated from the organic matter and sulphide of lead by means of ether (when I speak of ether I mean absolute ether), and then simply allowed to evaporate without purification, of necessity must contain some impurity, but that impurity is not tannin. The only difference between the process of 1871 and the process of 1886, is purification of the acid. Any other differences in the processes depend upon definite chemical action, namely, the substituting of sulphuretted hydrogen for sulphuric acid in one case, and the substituting of bicarbonate of sodium for subacetate of lead in the other.

If the gentlemen will examine minutely that portion of their ether extract that was soluble in water, which they have entirely overlooked or forgotten (see *AM. JOUR. PHAR.*, 1885, p. 21), they will find something of great interest to them.

Ad 3.—Messrs. Trimble and Schuchard state that "it is very poor chemistry to judge of the unknown constituents of a plant by its physiological action, or by the appearance of an ether residue under the microscope." Indeed, this is astonishing! What about the physiological action of strychnia, morphia, atropia and a host of others? Is not the action of these alkaloids such that you can be positive of their presence without any other chemical evidence? Let us suppose a hypothetical case of poisoning. The man swallowed something, we don't know what, but we find him in the following condition: A scarlet rash all over the body, great dilatation of the pupils, dryness of the fauces, constriction about the chest, difficulty of deglutition, etc. Any intelligent scientist would know that this man had either taken atropia, daturia or hyoscyamia; daturia could be excluded, because atropia and daturia are chemically and physiologically identical, and hyoscyamia can also be excluded, upon the ground that this alkaloid produces no scarlet rash upon the body. But to verify it, there is none of the substance left, for the man had swallowed all. A post mortem is made, the contents of the bladder and stomach, as well as

the blood, are examined, and from these contents the poison is extracted either by Otto's, Stas' or Dragendorff's methods.

After having separated it, the only chemical tests that we have are the reactions of the double iodides of bismuth and potassium and iodide of mercury and potassium. They produce precipitates in solutions of these alkaloids 'tis true, but they do the same with other alkaloids. And that the mydriatic alkaloids precipitate mercuric oxide from a solution of mercuric chloride does not help the case one particle, for all of the caustic alkaloids do the same. But such a minute portion, as 1 part in 130,000 parts of water, will produce dilatation of the pupil in the cat. Now, upon which would you rely, the physiological action, or upon the chemical reaction? For my part, I would have no hesitancy in saying that the man died from atropine poisoning. And, that it would be poor chemistry to judge of a crystalline residue, under the microscope, is simply absurd. If this is true, what would become of organic chemistry, uriology, histology, minute anatomy, physiology and pathology? If the gentlemen labor under that erroneous impression, I would advise them, in a most friendly manner, to read Lehmann, Frey, Virchow, and others. And after they have perused these works carefully, they will arrive at the conclusion that the microscope is the greatest aid to all scientific investigations that we possess.

Ad 4.—The very fact of the gentlemen not being able to isolate the acid, when they had a working process before them, is sufficient proof of "imperfect manipulation." If that will not suffice, I will refer them to the ether extract in their own analysis.

Ad 6.—The suggestion to "send 10 gms. of the so-called polygonic acid," &c., brings the whole matter down to a question of veracity, and, as I do not require any pharmaceutical society to verify any of my statements (as I am perfectly competent to do that myself), I shall have to most respectfully decline this part of the gentlemen's request. But I can, at any time, give evidence of gentlemen whose veracity is unimpeachable, and whose scientific rating is as good as any in the land.

Ad 7.—The evidence other than physiological action and microscopic crystals I will furnish with pleasure.

1st.—Polygonic acid is crystallizable.

2d.—Polygonic acid does not precipitate gelatin.

1st.—Tannic acid is not.

2d.—Tannic acid does.



3d.—Polygonic acid does not precipitate a neutral solution of a ferric salt.

4th.—Polygonic acid does not precipitate a solution of tartar emetic.

3d.—Tannic acid does.

4th.—Tannic acid does.

With the above reactions, I hope the gentlemen will be able to differentiate between tannic acid and polygonic acid.

1st.—Gallic acid produces a deep bluish-black color, with solutions of the salts of sesquioxide of iron.

2d.—When a solution of gallic acid is added to a solution of proto-sulphate of iron, and to this solution a little acetate of sodium is added, a deep violet color will appear.

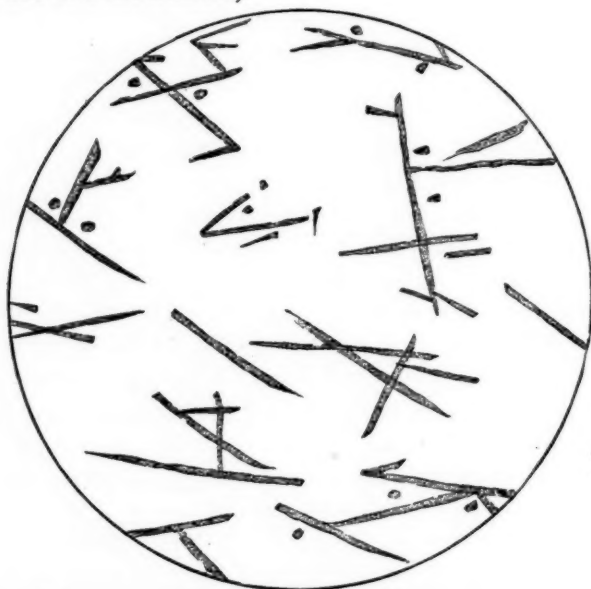
3d.—If a dilute solution of gallic acid is added to a dilute solution of caustic potash, an intense green color is produced.

1st.—Polygonic acid does not.

2d.—When polygonic acid is treated the same way, the violet color does not appear.

3d.—If a dilute solution of caustic potash is treated with a dilute solution of polygonic acid, no green color is produced, but, to the contrary, an intense yellow color is produced.

Besides the above reactions, the difference in crystalline appearance will be noticed (for gallic acid, see figure below; for polygonic acid, see page 280 of June number).



GALLIC ACID X700.

In conclusion, I will state that the only point I aimed to make was, that the acid, which I isolated from smart-weed, was neither tannic nor gallic acid. This I have succeeded in doing satisfactorily to my mind; the doubts of Messrs. Trimble and Schuchard to the contrary, notwithstanding; and with this I dismiss the subject.

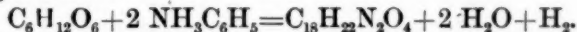
LOUISVILLE, July 12, 1886.

*Note by the Editor.*—The explanations on the two analyses thus far made have been so ample, that further discussion will be of no avail for the present. The plant in question is so widely distributed, both in North America and Europe, that it will doubtless be investigated also by others.

## ABSTRACTS FROM ITALIAN JOURNALS.

BY JOS. W. ENGLAND, PH.G.

*Glucose Test.*—Fisher, Jaksch and Grocco observe, in the *Annali di Chim. Med.-Farm.*, Apr. 1885, p. 307, that a mixture of 1 part glucose, 2 parts phenylamine, 3 parts sodium acetate, forms fine yellow crystals of a substance termed *phenyl-glucose-amine*, according to the following reaction:



In a very dilute solution of glucose, in order to recognize the yellow crystals, it is necessary to use the microscope. Jaksch and Grocco have applied the test clinically. A process much practiced is the following: Mix, in a capsule, 1 part phenylamine, 1.5 parts sodium acetate and 20 parts of urine, heat for twenty minutes upon a salt bath. Cool and stand for a half hour and examine the precipitate under the microscope. If the urine contains glucose, groups of needle-shaped crystals will be obtained. This method, it is claimed, will distinguish as low as 0.1 gm. or less in 1 liter of urine.

*Solubilities of Lithium Carbonate.*—Bèvade (*Bull. Soc. Chim.*, xliii, p. 123, *Annali di Chim. Med.-Farm.*, 1885, p. 313) gives his experience, relative to the solubility of lithium carbonate in 100 parts of water, as follows:

0° C.....	1.539 parts.
10° ".....	1.406 "
20° ".....	1.329 "
50° ".....	1.181 "
75° ".....	0.866 "
100° ".....	0.728 "

At 102° C., boiling for fifteen minutes, dissolves 0.796 parts, and boiling for thirty minutes, dissolves .955 parts of the salt. According to the theory of the writer, since the solubility of the lithium compound diminishes with the increment of heat to 100° C., and then increases, he believes this increment to be due to the formation of a basic salt less soluble in cold than in hot water.

*Ferro Pagliari*.—Dr. L. Vinni, in *L'Orosi*, Sept. 1885, states that the "Ferro Pagliari" so largely used at present in Italy, is, physically, a limpid, transparent liquid, of clear, greenish color, inodorous, styptic, and acid in reaction and taste, even when largely diluted. The solution has a specific gravity of 1.050 (Skoda), and mixes with watery and dilute alcoholic liquids unchanged. If a dilute solution be treated with tannin or potassium ferridcyanide, the presence of a ferrous salt is quickly evinced, and on the addition of silver nitrate, a voluminous precipitate of chloride is formed. Preserved in enclosed vessels and exposed to the light, it remains unchanged. It has been recently introduced extensively by Pagliari, of Florence, already noted for the well-known haemostatic liquid which bears his name, *Aqua Pagliari* (solution of alum and benzoin, see AM. JOUR. PHAR., 1864, p. 375). He claims that it represents the very best form of iron administrable, and advises its use in doses of 10 drops or 14 to 20 drops a day, *i. e.*, half at breakfast and the other half at dinner, largely diluted with water.

This preparation, without question, is analogous to the "Liquor Ferri Chlorati (*s. muriatici oxydulati*)" of the former German Pharmacopoeia (see National Dispensatory, third edition, p. 676), which is made by adding 520 parts of hydrochloric acid to 110 parts of iron-wire, allowing chemical reaction to ensue; heating, however, toward the end, to facilitate the emission of hydrogen. Then rapidly filter and to the filtrate, after the addition of 1 part hydrochloric acid, add sufficient distilled water to make the finished product weigh 1,000 parts.

*Analysis of Male Fern*.—G. Dacomo (*Annali di Chim. Med.-Farm.*, Jan. 1886, p. 19) has subjected to fresh chemical study, the rhizome of *Aspidium Filix-mas*, limiting himself, for the present, to the consideration of the chemical nature of the ethereal extract. Thirty kilograms of material were exhausted with ethylic ether, in a percolator, and after spontaneous evaporation, left 1,750 grams of ethereal

extractive. This extract, after treatment with a mixture of alcohol and ether, left as a remainder a brown pulverulent residue of 70 grams in weight. The insoluble residue so obtained was agitated with a solution of caustic potash (1-100), and from the filtered liquid, on the addition of acetic acid, gave a voluminous precipitate of filicic acid (filicin of Trommsdorff). The portion that was not dissolved by the potassa, and that remained upon the filter, was then exhausted with boiling alcohol, which deposited, on cooling, a white, flocculent material, wax-like in appearance, that after repeated crystallizations from alcohol, was used for the ultimate analysis.

The figures he obtained for his analyses led to the formula  $(C_{13}H_{26}O)_x$ , and were as follows:

	I.	II.
C. per 100.....	78.99	78.80
H. " .....	12.98	13.28
O. (by difference).....	8.03	7.92
	<hr/> 100.00	<hr/> 100.00

This substance is insoluble in water, very little soluble in ether or in cold alcohol. It is not saponified on prolonged ebullition with caustic potassa in concentrated alcoholic solution. The residue, left on the filter, after the boiling alcohol treatment, was merely extractive.

The more soluble portion of the ethereal extract, that is, that dissolved in the mixture of alcohol and ether, was, after reduction to extractive consistency, exhausted first with cold water. This aqueous solution, treated with acetate of lead to precipitate the tannin (filitanic acid?), washed and subjected to a current of hydrogen sulphide to remove excess of lead, left a saccharine residue.

The residue from the aqueous exhaustion was then treated with alcohol at 85° C., which, evaporated, left, as residue, a large quantity of a black extractive, soluble in caustic potash. The small residue left consisted of a wax-like fatty material soluble in alcohol, especially in the cold. From the alcoholic treatment, there did not remain as residue more than a small quantity of green fixed oil.

Mr. Dacomo is continuing his studies, toward the general nature of the volatile principles of male-fern, the results of which he will make the subject of another paper.

## GLEANINGS FROM FOREIGN JOURNALS.

BY GEORGE H. OCHSE, PH.G.

*Purification of Naphthalin by means of Soap.*—By repeatedly submitting commercial naphthalin to pressure in strong hydraulic presses and distilling, then treating with solution of soap at a temperature of about 85° C., which dissolves most of the naphthalin, and, on adding water and reducing the temperature to about 50° C., the naphthalin precipitates, the oily substances remain dissolved with the soap. By washing and redistilling, Link obtained almost chemically pure naphthalin in large snow-white flakes.—*Phar. Zeit. für Russland*, xxv, p. 279.

*Salol.*—Salol is a derivative of salicylic acid, an H atom being replaced by phenol. Salol is a white powder having a slight aromatic odor and, owing to its insolubility in water, it is tasteless. Salol is devoid of the disagreeable effects of salicylate of sodium. Prof. Neucky has studied the physiological effects of salol and states that it is merely resolved into its components without undergoing any further decomposition, as both phenol and salicylic acid are found in the urine. It is given in the same doses as salicylate of sodium, four gms. can be given daily without producing any visible effects. Although containing 38 per cent. of carbolic acid and coloring the urine almost black, no symptoms of intoxication are produced, evidently owing to the fact that it passes through the stomach unchanged. Prof. Neucky has demonstrated that the decomposition is due to the pancreatic juices in the duodenum. Dr. Saly finds salol to be an antipyretic and antiseptic. As an antiseptic, it is employed advantageously in putrid affections of the mucous membranes.—*Phar. Centralhalle*, xxvii, p. 219.

*Bacteria in Sea-Air.*—Moureau and Miquel have made microscopic analyses of sea-air at various places, and state, as the result of their observations, that when the breezes come from the sea the air is almost free from bacteria. When 100 kilometres out at sea the breezes coming from shore are also almost free from them, thus proving that the sea is an unsurmountable barrier to contagion. On vessels making long passages it was noticed that although the compartments were not entirely free from bacteria, they contained about 100 times less than in a Parisian home.—*Archiv der Pharmacie*, 1886, p. 368.



*Characteristic Reaction for Citric Acid.*—To distinguish citric acid from malic acid or tartaric acid, M. Mean fuses together 1 gram of citric acid and 70 centigrams of glycerin in a porcelain capsule by cautiously heating until the mass begins to bubble up and emit vapors of acrolein; on adding a small quantity of ammonia and about 2 drops of fuming nitric acid, or a 10-per-cent. solution of hydrogen peroxide a bright green coloration is produced, which gradually turns blue if the heat is continued. Neither malic acid nor tartaric acid show the same reaction.—*Journal de Pharm. et de Chimie*, 1886, xiii, p. 477.

## CONTACT ACTIONS.

BY D. MENDELEJEFF.

It is a generally received opinion that not only the molecules as a whole, but each of the constituent atoms are in motion, the movement of the latter being conditioned by the limits of the molecule. If the conception be reasonable, then in every state of aggregation there are presumably motions of two kinds, the one internal, the other superficial. The contact of two molecules, as also conditions of temperature, pressure, and electric potential, influence each kind of motion; thus the phenomenon of catalytic or contact action gradually passes into that of dissociation or of decomposition. Herein the decomposition of hydrogen peroxide is analogous to that of many detonating solids, in which a disturbance of atom-equilibrium at the superficies of the molecule causes its complete disruption.

Now supposing two substances, A and B, are in superficial contact with one another under such conditions that not only the superficial movement of the constituent parts, but also of the molecule as a whole, is disturbed; then three distinct cases are possible:

*Firstly.*—The atoms change their kind of motion without returning to their former state of equilibrium; no chemical change ensues, but merely a physical phenomenon, such as alteration of electric potential, condensation of gases, whether by a cold surface or by porous substances.

*Secondly.*—The internal movement of the molecule is altered, so that molecules of a different kind are formed by combination, replace-

ment, or decomposition. These changes are accompanied by an alteration of the energy of the system, but although the total heat effect observed is the algebraical sum of the energy changes, conditioned by the several changes of motion, yet thus far it is not possible to assign to each particular change its peculiar heat effect. As an example of chemical changes induced by the mere superficial contact of the molecule as a whole, the author quotes the well-known experiments of Spring on the combination of metals with sulphur by mere pressure.

*Thirdly.*—The motion of the atoms within the molecule taken by itself can be of such a kind as to produce a chemical change or formation of a molecule of a different kind, such as the so-called isomeric transformation. Or again, the superficial contact of B with A, a mixture of heterogeneous molecules may cause either a decomposition or a combination between them, as exemplified in the experiments of Hautefeuille and Lemoine, which demonstrate that the presence of porous substances can induce the combination of hydrogen with iodine, and conversely the decomposition of hydriodic acid, both reactions attaining a limit. Of a similar nature is the combination of hydrogen with oxygen, induced by contact with finely divided platinum, and also the recent experiments of Konovaloff on the decomposition of haloid derivatives of pentane by contact with materials in a state of fine division. These phenomena are generally classified under the title of catalytic or contact actions. Such can only be explained on the hypothesis that a stable substance B is in such a condition that a moderate perturbation of the constituent atoms at its superficies produce no disturbance in the atom-equilibrium of the molecule; whilst in the case of a changeable substance A, the equilibrium of atoms within the molecule is of such a kind that a comparatively unimportant change of motion at the superficies can cause the atoms to assume a different form, that is to say, can cause the production of a different kind of matter. If this be a correct representation of these contact phenomena, then the induced reactions should either be accompanied by a slight heat change, or, if accompanied by a considerable heat change, then the reaction should be capable of proceeding by itself in the direction of the heat evolution. An example of the former case is the reaction between hydrogen and iodine; of the latter is the system of hydrogen with oxygen in contact with platinum, which causes a lowering of

the reaction-temperature. In conclusion, it is remarked that it is desirable to find a method of research, not only to explain the connection of contact actions with other kinds of chemical change, but also even of the mechanism of the chemical change itself.—*Jour. Chem. Soc.*, May.—*Berichte D. Chem. Ges.*, 1886, pp. 456–463.

## PARAQUINANISOIL AND DERIVATIVES.

By Z. H. SKRAUP.

Paraquinanisoil is best prepared by heating a mixture of 78 gms. anisidine, 50 gms. nitranoil, 320 gms. glycerol, and 125 gms. sulphuric acid for two hours; 50 gms. more of sulphuric acid are added, and the heating continued for two hours longer. The product is then diluted with water, distilled with steam, and the residue treated with potassium dichromate, which causes a precipitation of quinanoil chromate; this is then purified. Pure quinanoil forms a yellowish oil, which soon acquires a green, then a reddish-violet color; it boils with slight decomposition at 304–305° (uncorr.). Sp. gr. at 20° = 1.542 (water at 20° = 1). *Paraquinanisoil hydrochloride*,  $C_9NHOMe_2 \cdot HCl + 2H_2O$ , forms colorless prisms, readily soluble in cold water and hot alcohol, insoluble in ether. It loses its water of crystallization over sulphuric acid. The *chromate* forms long, gold-colored, silky needles, which, when exposed to air, lose their lustre and become brownish; it is very sparingly soluble in cold water. The *neutral sulphate*, *acid sulphate*, *tartrate*, and other salts are described. The aqueous solutions of the salts all show a blue fluorescence. Chlorine-water and ammonia act on the salts, giving the green color characteristic of quinine compounds.

*Paraquinanisoil methiodide* crystallizes from water in long, gold-colored, lustrous needles, which melt with evolution of gas at 235°. It is insoluble in ether, readily soluble in hot water and alcohol.

*Thalline*,  $C_9H_{10}MeNO$ , is prepared by reducing quinanoil with tin and hydrochloric acid; it forms thick, white prisms, sparingly soluble in water and light petroleum, very readily in alcohol, ether and benzene. It melts at 42–43°, and boils at 283° (uncorr.; bar. = 735 mm.). When treated with ferric chloride or other oxidizing agents, it acquires first a yellow, afterwards a dark emerald-green color.

Silver nitrate produces this coloration with separation of silver. *Thalline hydrochloride*,  $C_{10}H_{13}NO \cdot HCl$ , crystallizes in well-formed prisms, sparingly soluble in alcohol. The *sulphate* (with 2 mols.  $H_2O$ ) and other salts are described. *Acetylthalline*,  $C_{10}H_{12}NO \cdot Ac$ , forms clear, broad, monoclinic prisms, which melt at  $46-47^\circ$ . Its solubility resembles that of thalline. Bromine acts on thalline with formation of a compound,  $C_{10}H_6Br_3NO$ ; it is a pale yellow powder, melting at  $193-194^\circ$ .

*Methylthalline*,  $C_{10}H_{12}NOMe$ , is prepared by the action of methyl iodide on thalline. It forms a thick, colorless oil, which, when kept becomes brown; it boils at  $277-278.5^\circ$  (uncorr.). When a solution in dilute hydrochloric acid is treated with ferric chloride it acquires a cherry-red color, which changes to reddish-yellow when kept long. The *hydrochloride* and *sulphate* crystallize in well-formed prisms, readily soluble in water.

*Thalline hydriodide* ( $C_{10}H_{13}NO$ ) $_2HI$ , and *quaternary dimethylthalline iodide*,  $C_{10}H_{12}NOMe_2I$ , are formed in the preparation of methylthalline. The former compound crystallizes in flat prisms, melting at  $155-156^\circ$ , insoluble in ethylbenzene, light petroleum, readily soluble in hot alcohol. The latter compound forms long prisms, insoluble in light petroleum, readily soluble in alcohol and in water, from which it crystallizes with 1 mol.  $H_2O$ . It melts with evolution of gas at  $223-224^\circ$ . Boiling aqueous potash, hydrochloric and nitric acids, do not act on it.

*Ethylthalline*,  $C_{10}H_{12}EtNO$ , is a thick oil which boils at  $287-287.5^\circ$ , with slight decomposition. It is insoluble in water, very readily soluble in alcohol, ether, and in mineral acids. Some salts were prepared; they are very hygroscopic and crystallize with difficulty. *Ethylthalline ethiodide* forms white needles, readily soluble in alcohol and in water, insoluble in ether; it melts, with evolution of gas, at  $131-133^\circ$ ; when distilled it decomposes into ethyl iodide and ethylthalline.

Benzyl chloride acts on thalline with formation of a base, probably benzylthalline; when treated with ferric chloride, it gives the same characteristic red color as methyl- and ethyl-thalline.

The physiological properties of several of the compounds mentioned in the paper are described. The paper concludes with remarks on the constitution of quinine.—*Jour. Chem. Soc.*, 1886, p. 79.—*Monatsh. Chem.*, vi, 760-784.

## HYDROQUINONE AND ARBUTIN.

By HUGO LAURENTZ, M. D.

Abstract of an Inaugural Dissertation, University of Dorpat, 1886, communicated by the author.

The primary object of the author's investigations was the detection of the two substances named, in the animal tissues and excretions, and a number of experiments were therefore made with the view of finding characteristic tests. The color reactions of *hydroquinone*, obtained after evaporating the alcoholic solution, are as follows: Fröhde's reagent, violet color, becoming darker and gradually green from the margin. Bromine vapors to the moist residue gray, under the microscope showing stellate or fascicular needles of a blackish color with green hue, and becoming intensely green with ammonia, quickly changing to brown. Chlorine vapors or chlorine water, like the preceding, but the green color with ammonia less bright. The same behavior was also shown with dilute solutions of bromine in potassium bromide, and of iodine in potassium iodide. Chlorinated lime solution forms at once dark green crystals of green hydroquinone, becoming brown and dissolving in excess of reagent colorless. Silver nitrate warmed, black precipitate and characteristic pungent odor of quinone somewhat resembling that of iodine. Ferric chloride, at first green hydroquinone, and with more of the reagent quinone. All these reactions are observed with 0.02 mgm. of hydroquinone, and several other less characteristic or less delicate reactions are described by the author.

Hydroquinone was next mixed with urine, blood and other organic matters, from which after acidulation with sulphuric acid it was not dissolved by petroleum benzin, but was taken up by benzol, chloroform, ether and acetic ether, the residues left by the evaporation of the latter yielding the color reactions most distinct. The urine passed within twelve hours, after having taken 0.1 gm. hydroquinone, yielded enough residue to give slight reactions with Fröhde's reagent. On increasing the dose to 0.15 gm. reactions were also obtained with ferric chloride (odor of quinone) and with silver nitrate; but chlorine water and ammonia gave yellow or brown color. The urine was now boiled with 1 per cent. sulphuric acid, agitated with acetic ether, the residue of evaporation boiled with sulphurous acid, again shaken with acetic ether and



evaporated; the residue gave no crystals with chlorine water, but a distinct green color on the further addition of ammonia. Rabbits took from 0.05 to 0.1 gm. hydroquinone without bad effect; cats were killed in one hour by 0.2 gm., and in 8 hours by 0.1 gm. of hydroquinone, after tonic and clonic convulsions. The presence of the compound was determined in the blood, urine and different organs, including the brain, but not in the muscles or in the feces. The excretion of the hydroquinone from the human body seems to be completed in about 15 hours. Frœhde's reagent was found to be the most delicate test, though not conclusive in all cases.

Similar experiments, made with *arbutin*, showed that this is excreted with the urine in about 15 hours, but is not found in the feces. Cats, after taking 1.0 gm. of arbutin died in 10 hours after almost constant convulsions; rabbits took the same dose without ill effects. The blood and most of the organs of animals poisoned with arbutin, showed its presence more or less distinctly. It may be isolated by mixing the liquids with sulphurous acid and agitating with acetic ether; chloroform and ether give less reliable results, and petroleum benzin does not dissolve arbutin. On boiling the liquids with 4 per cent. sulphuric acid, hydroquinone is produced.

The reactions of arbutin are as follows: Frœhde's reagent colors 0.02 mgm. arbutin violet, becoming darker and green from the margin (like hydroquinone). Concentrated sulphuric acid and dilute solution of ferric chloride, of each 1 drop, strongly heated, color 0.02 mgm. arbutin dark chestnut-brown (hydroquinone is colored olive-green). Silver nitrate with 1 mgm. arbutin, black precipitate, no odor. Ferric chloride, diluted and warmed, steel-blue color with 1 mgm. arbutin. Bromine vapors, followed by ammonia, gradually green color, changing to brown. Chlorine water dissolves colorless, changing with ammonia, in the presence of more than 0.1 mgm. arbutin, to green, finally brownish (quinine, which gives a similar reaction, is not taken up by ether from the acid liquid). Heated with chlorine water, followed by a little ammonia or potassium ferricyanide, more than 0.02 mgm. arbutin gives a brown to brownish-violet color. More than 0.1 mgm. arbutin triturated with sugar and moistened with sulphuric acid, gradually turns reddish, then blue, and, finally, green.

J. M. M.

## ON THE OCCURENCE OF PEPSIN AND TRYPSIN IN NORMAL HUMAN URINE.

BY DR. SAHLI.

The investigation of the amount of pepsin in urine is based on the facts given by v. Wittich that blood fibrin, both in neutral and ac'd solutions, absorbs pepsin with great eagerness, and that the amount which a flake of fibrin absorbs depends on the amount of fibrin present in the fluid.

To compare the amount present in two perfectly fresh urines, equal quantities of well-washed fibrin are introduced into them, and left in them for equal periods. The urine is poured off, and the flakes washed with distilled water, after which they are placed in equal quantities of .1 solution of hydrochloric acid.

Since now, according to Brücke, within certain limits the speed of digestion is dependent on the amount of ferment, conversely we may form an estimate of the amount of ferment present from the time required to effect the disappearance of the fibrin.

In this way Sahli found that human urine invariably contains pepsin, and that the amount present undergoes very great variations in the course of 24 hours. The morning urine contains the greatest amount, then the urine before dinner, then that directly before supper. The first minimum occurs two hours after breakfast; the second, more marked, one and a half to two and a half hours after the mid-day maximum. A comparison of the curve exhibiting these variations with that which shows the secretion of the fundus of the stomach, leads to the conclusion that the pepsin in the urine is derived, not from the pepsinogenic substance of the gastric glands, but that it is the completed secretion of the stomach, resorbed along the digestive tract, and carried by the blood current to the kidneys, by which it is partially eliminated.

Urine also contains trypsin, which, however, cannot be isolated by fibrin. Still, Sahli convinced himself that the amount of this ferment also varies, being regularly diminished after dinner, and greatest after breakfast. — *Med. Chronicle*, June; *Pflüger's Archiv*, xxxvi. p. 209.

## PREPARATION OF KEFIR AND OF KOUMIS.

BY DR. ROGELMANN, OF GRAZ.

Milk-wine, or kefir, may be made by the following method: One volume of buttermilk is to be mixed with one to two volumes of sweet milk, poured in a bottle, and allowed to stand. In three hours active fermentation will set in, which in about three days will be at an end. The product is a fluid smelling like wine, and containing alcohol, carbonic acid, lactic acid, and casein. The following precautions are to be observed in this in every way simple and inexpensive procedure. The sweet milk used ought not to be wholly freed from the cream, and the bottles ought to be of a size that the milk fills only two-thirds of them. The fermenting milk is to be shaken daily vigorously (about two or three times), during which manipulation a cork is to be placed firmly in the bottle, but removed after the shaking, in order to allow the carbonic acid to escape. The opened bottle is to be placed in a horizontal position, at least twice daily, for a period of ten minutes, in order to let fresh air take the place of carbonic acid, and to thus prevent the stoppage of fermentation. If a very effervescent liquid be desired, the bottles are toward the close of the fermentation process allowed to stand continuously in a perpendicular position. In order to obtain new quantities of this "milk-wine," we add to a certain quantity of sweet milk one-fifth its volume of milk thus fermented, and are so able to continue this production *ad libitum*. The most favorable temperature for the preparation of this milk-wine is 15° (C).

Koumis may be made in the following way:—A pint of buttermilk or a bottle of koumis is added to a gallon of new milk in a basin. This is stirred steadily round in one direction for a quarter-of-an-hour, and covered up for twelve hours, when it is again stirred in the same direction for another quarter-of-an-hour. It then stands for twelve hours more, covered up from dust, when it is put in champagne bottles, and the corks tied down. After a few days it can be used, being well shaken before opening, and care being exercised in opening the bottles.—*Med. Chronicle*, June.—*D. Mediz. Ztg.*, Jan. 14, 1886.

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**Caffeine** in infection of 0.1 gm. was successfully used by Dr. A. Langgard in a case of poisoning by curare. He further recommends caffeine in poisoning by conine.—*D. med. Woch.*, No. 12, 1886.

# ON COMMERCIAL SULPHATE OF QUININE.

The purity of commercial sulphate of quinine has been the subject of a number of communications to European journals. One of these papers has been republished on p. 243 of the present volume of this Journal. Dr. O. Hesse (*Phar. Jour. and Trans.*, March 27, 1886) shows that the commercial salt containing a moderate amount of cinchonidine sulphate, can be deprived of this impurity by two re-crystallizations from boiling water. On further re-crystallization, no alteration should take place in the rotatory power, which for absolutely pure quinine sulphate, was ascertained to be  $[a]_D = -233.75^\circ$ . It is also shown that from moderately concentrated solutions the quinine sulphate crystallizes together with the cinchonidine sulphate in massive brilliant needles, which may be regarded as an actual double salt. Cinchonidine hydrochlorate crystallizes from concentrated solutions in needles with 2 H<sub>2</sub>O, and from dilute solutions in octohedrons with 1 H<sub>2</sub>O; but when mixed with a preponderating amount of quinine hydrochlorate (which crystallizes only in needles with 2 H<sub>2</sub>O), the two salts crystallize in needles with 2 H<sub>2</sub>O, not separately, but in all proportions together.

Dr. J. E. De Vrij (*The Chemist and Druggist*, May 1, 1886) observed in 1883 that quinine sulphate tested in Hesse's quinometer (see *AM. JOUR. PHAR.*, 1879, p. 136) would invariably yield crystals of cinchonidine if the ethereal liquid was kept for 12 or 14 days; and he recommended (*Nieuw Tijdschr.*, 1884, p. 10) as the best practical means for obtaining pure quinine sulphate, that it be prepared from the acid sulphate, which never contains cinchonidine. Dr. De Vrij's assertion that no commercial quinine sulphate containing less than 5 per cent. of cinchonidine sulphate was to be met with, was based upon a number of assays, one of which, made since, is described, and consists in converting the salt into the acid sulphate, precipitating the mother liquid with soda, converting these alkaloids into tartrate, and submitting to the optical test (Oudemans, 1875, 1877). This method showed the sample to contain 7.41 per cent. cinchonidine sulphate, and is stated to afford approximate results only, while accurate results (9.46 cinchonidine sulphate in the same sample) are stated to be obtained by mixing a hot solution of quinine sulphate with a hot solution of an equal weight of sodium tartrate, drying the precipitated tartrate below 30° C., and dissolving 1 gm. of this salt in 7.5 ccm. of normal

hydrochloric acid and sufficient water to measure 50 ccm. at 17° C.; this solution is tested in Laurent's polariscope in a tube 0.5 m. in length. Two commercial samples of English manufacture were thus found to contain 5.723 and 10.850 of water, and 9.508 and 6.942 of cinchonidine sulphate; two of French manufacture, 14.646 and 13.762 water, and 9.072 and 12.448 cinchonidine salt; five of German manufacture, between 12.426 and 17.842 water, and between 4.730 and 8.180 cinchonidine salt, and one of Dutch manufacture, 13.714 water and 8.355 cinchonidine salt, while a sample made at Amsterdam from the acid sulphate contained 12.425 water of crystallization and was free from cinchonidine.

Dr. O. Hesse (*Phar. Jour. and Trans.*, June 5, 1886) states that the rotatory power of quinine sulphate on being heated to 120° C. is not augmented, but undergoes a minute reduction, as he showed in 1876 (*Liebig's Annalen*, vol. 182, p. 154), and criticises the different results obtained by Dr. De Vrij with the same sample of quinine salt by means of the optical method. By this method, however, cinchonidine can be most accurately determined in the presence of quinine in the absence of hydroquinine, which is usually present in commercial quinine sulphate. In 1882, Dr. Hesse published a note on hydroquinine (see *AM. JOUR. PHAR.*, 1882, p. 363), and a more extended memoir will shortly be published. This alkaloid which is associated with quinine in cinchona bark, is a saturated compound while quinine is not. Its neutral sulphate crystallizes with 8 H<sub>2</sub>O, sometimes with 6 H<sub>2</sub>O; the anhydrous salt requires at 15° C. 348 parts of water for solution, and although 5 ccm. of this liquid require 25 ccm. of ammonia, sp. gr. .960, for the complete solution of the alkaloid, it cannot be detected in quinine sulphate by the pharmacopœial test. The two sulphates form a compound crystallizing in long delicate needles, and hydroquinine cannot be separated completely except by converting quinine sulphate into the acid salt, and recrystallizing this from water or alcohol, when hydroquinine remains in the mother liquors. Its tartrate is almost as sparingly soluble as quinine tartrate.

As a therapeutic agent hydroquinine is of the same kind as quinine sulphate. But when the optical method of testing is applied to such a salt, the hydroquinine sulphate present in it produces an effect simulating that of cinchonidine sulphate in the proportion of 1:0.42, and it is in this way that the optical method of testing leads to a result that is incorrectly unfavorable so far as relates to the amount of



cinchonidine thus apparently indicated. In some instances the optical method has given data indicating the presence of some 2 per cent. of cinchonidine sulphate in material that did not contain a trace of it.

The rotatory power of the alkaloids in question under the conditions laid down by Oudemans,<sup>1</sup> were determined by Dr. Hesse to be as follows:

For concentration A: Quinine tartrate	(a) <sub>D</sub> =	—216.6°
Cinchonidine tartrate	"	—134.6°
For concentration B: Quinine tartrate	"	—212.5°
Hydroquinine tartrate	"	—176.9°
Cinchonidine tartrate	"	—132.0°

J. M. M.

### THE KOLA NUT AND ITS ACTION.

By WATSON SMITH, F.C.S., F.I.C., LECTURER ON CHEMICAL TECHNOLOGY, VICTORIA UNIVERSITY.

The kola nut (*Cola acuminata*) is indigenous to the West African coast. Heckel and Schlagdenhauffen say the seeds are reputed to clarify and render healthy the most foul waters, and even to make tainted meat edible. A member of the Linnean Society gave, at a meeting of that society, an account from actual experience of the kola, and of certain effects produced by it. He stated that the foreman of his estate was habituated to excess in drinking, and that every Saturday his habit got considerably the better of him. However, he had a wife who cared for him (and herself), and she reduced a kola nut to the condition of a paste every Monday morning shortly before her husband's services were required, and administered the paste to the man. In thirty minutes his head was clear again. But it is further maintained that after such an application of the kola a drunkard cannot return to alcoholic stimulants for some days without feeling nausea. At some of the garrison towns a native sits at the road side, and sells the nuts as the soldiers pass. By the time the men reach the barracks they are quite clear-headed, and the stupefaction

<sup>1</sup> The solutions with which Oudemans operated, and his results, are as follows:

	Concentration A.	Concentration B.	Concentration C.
Tartrate . . . . .	0.4	0.8	1.2 gm.
Normal hydrochloric acid . . . . .	3.0	6.0	9.0 ccm.
Distilled water sufficient for . . . . .	20.0	20.0	20.0 ccm.
Quinine tartrate (a) <sub>D</sub> = . . . . .	—215.8°	—211.5°	—207.8°
Cinchonidine tartrate (a) <sub>D</sub> = . . . . .	—131.3°	—129.0°	—128.1°

EDITOR AM. JOUR. PHAR.

caused by drinking spirits is gone. On the west coast of Africa, the Mahometans and Arabs surpass the natives in point of drinking capacity, for whilst drinking they also chew kola, and so anticipate the after ill-effects otherwise experienced, and prevent them. A little supply of kola nut, I would suggest, or its paste, might prove a useful help to the professional heads of our hydropathic establishments, serving for use as a kind of anti-periodic against those attacks of alcoholic craving, sometimes leading inmates to wander forth and commit themselves to positively dangerous excesses. The kola nut contains very considerable quantities of caffeine (over two per cent.), and also some theobromine, and it forms the basis of a stimulating food (the paste) of great value.

Dr. A. Hudson, Medical Inspector of the United States Navy, has recently stated in a letter to Dr. Thomas Christy, of London, to whom he has applied for an experimental supply of the kola paste, that being put in possession, by the Surgeon-General of the U. S. Navy, of a sample of the paste, he had employed it in a case of mitral disease, with granular kidney of slow progress, the average quantity of urea contained in the urine being about half the normal. With much lassitude and malaise there were intense headaches (probably uræmic) at intervals of three or four weeks, and some dyspeptic symptoms. The kola was given economically for nearly a month, with apparently decided benefit. Certainly the tone and vigor of the patient improved, and the single headache which occurred within six weeks had less than a day's duration, and was of a mild character. Synchronously there was an increase in the amount of urea excreted, as well as the quantity of urine.—*Med. Chronicle*, June, 1886.

## CONSTITUENTS OF LOBELIA.

BY HERMANN VON ROSEN, M. D.

Abstract of an Inaugural Dissertation, University of Dorpat, 1886, communicated by the Author.

*Lobelia nicotianæfolia* is indigenous to southern and western India; the infusion of the leaves is used as an antispasmodic. The lower part of the stem is woody, about  $1\frac{1}{2}$  inches in diameter; the upper part is hollow and tubular. The leaves resemble tobacco leaves in shape, are finely toothed and hairy. The capsules are of the size of a pea, two-celled, and contain numerous light brown seeds which are

about  $\frac{3}{16}$  inch long, oval, flattened, and finely striate. The dried plant is covered with numerous resinous dots, and has an acrid, biting taste. Dr. H. v. Rosen obtained from the powdered herb

Moisture.....	12.77
Ash (of which in water soluble 2.04 per cent.).....	9.35
Sand.....	0.47
Albuminoids and alkaloids soluble in water.....	2.49
Albuminoids soluble in soda solution.....	8.23
Insoluble albuminoids.....	9.09
Cellulose.....	28.58
Fat and other substances soluble in petroleum benzin.....	3.68
Resin and chlorophyll soluble in ether.....	2.01
Mucilage soluble in water.....	2.50
Metarabic acid (pectin).....	0.27
Lobelic (?) and other vegetable acids.....	6.21
Amylaceous substances.....	1.29
Other substances soluble in water.....	1.60
Other insoluble bodies (cuticular substances, lignin, etc.) .....	11.46

100.00

The presence of alkaloids was ascertained from the acid infusion which was successively agitated with petroleum benzin, benzol and chloroform, then rendered alkaline with ammonia and agitated as before. The benzin solution from the alkaline liquid contained the liquid alkaloid *lobeline*, and the chloroform solution when evaporated left striated prisms of another alkaloid; minute quantities of the latter were also found in the benzol solutions from both the alkaline and acid liquid, and a somewhat larger quantity in the chloroform solution from the acid liquid. The benzin solution of *lobeline* gives with ether and hydrochloric acid a whitish precipitate of *lobeline hydrochlorate*, and this salt yields with Fröhde's reagent the characteristic red color passing into violet, and gives precipitates with picric acid, auric chloride and with bromine in potassium bromide. The second alkaloid yields heavy precipitates with the usual reagents, except picric acid and tannin which cause in the solutions a slight turbidity; Fröhde's reagent gives a brown color changing to green, and sulphovanadic acid causes a cherry-red or violet-red coloration.

The same two alkaloids were also obtained from *Lobelia inflata*, Lin., though the volatile *lobeline* was present only in minute quantity, the herb having been on hand for a prolonged time.

The physiological experiments, made with *lobeline* sulphate prepared by Merck, and with the two alkaloids obtained from the above-

named two species of lobelia, gave almost identical results and agreed with those obtained by Dr. J. Ott with Procter's lobeline (see AM. JOUR. PHAR., 1875, p. 127), though the author differs in some respects from Dr. Ott in the explanation of the effects observed. J. M. M.

## EXAMINATION OF THE SO-CALLED SPRUCE-GUM.

BY ADOLPH F. MENGES.

The so-called spruce-gum of commerce is the balsamic exudation of *Abies nigra*, Poiret, the black or double spruce, which, according to Gray, occurs in swamps and cold mountain woods from New England to Wisconsin and northward, and southward along the mountains. The source of this commercial article was traced by Professor E. L. Patch a few years since,<sup>1</sup> and was then definitely referred to the above tree, although also stated that a much smaller quantity is produced by *Abies alba*, Michx., the so-called white spruce, but none from *Abies canadensis*, Michx., or the hemlock spruce, which affords the officinal Canada pitch or hemlock pitch.

In order to be assured of the true botanical origin of the substance used in my investigation, some twigs and cones of the tree affording the so-called gum were obtained from Vermont and submitted to Professor William Trelease, by whom they were readily identified as the above-mentioned *Abies nigra*.

The method of collecting spruce-gum has already been quite accurately described,<sup>2</sup> but the following information relating thereto would seem to possess some interest, and for which I am indebted to Mr. J. G. Rich, of Bethel, Maine, who has been engaged in the collection of this substance for a number of years. Mr. Rich writes substantially as follows: Spruce-gum is not obtained by puncturing the trees,—at least, not to any great extent; the causes for the flow of sap being natural ones, such as a rotten knot or a seam up and down the tree caused by extreme heat or cold. Therefore, the gum does not occur on any particular part of the tree, but is found from the bottom to the top on such as are injured or decayed. Simply bruising the tree will not cause a flow of sap—the cavity must extend through the bark and sap-wood. This causes a good flow, which is at first transparent

<sup>1</sup> New Remedies, January, 1882, p. 23.

<sup>2</sup> American Druggist, October, 1885; also, Pharm. Journal (London), 1885, p. 370.

and viscid, but upon exposure becomes opaque and hardened, gradually assuming various shapes, and becoming of a darker color from year to year. It has been found that those trees situated on low or level lands yield little or no gum. The trees yielding the largest amount are located on the mountains, more especially the tops and sunny sides, and those woods which have been thinned out by logging or otherwise. The gum is collected in winter time by men on snow-shoes, when there are several feet of snow on the ground, as they are thus capable of traveling much faster. They are provided with a little contrivance made by taking a small tin cup, to which is fastened a chisel in such a way that the gum may be cut off and allowed to fall into the cup; the latter is so arranged with a holder that a long pole may be inserted, thus enabling them to reach the pieces on the upper parts of the tree. They collect as much as can conveniently be carried, taking it to their houses, where it is cleaned by the women and children. Each piece has to be scraped separately, after which operation it is sorted and brought into the market.

The gum<sup>1</sup> at my disposal was obtained from a dealer in Vermont, who states that it is collected in Maine, New Hampshire, Vermont and Canada, the largest amount and that of the best quality coming from the latter point. It occurs in irregular pieces of various shapes and sizes, is of a reddish-brown color, brittle, and breaks with a rough fracture; it has a faint odor, and, when chewed, a terebinthinous and slightly bitter taste. It is readily soluble in alcohol, and the solution has an acid reaction. Among the fragments of gum, pieces were observed which gave two distinct color reactions with strong sulphuric acid, the one giving a pinkish-purple, the other a deep green coloration. Selected pieces of the gum when freshly broken exhibit a white surface, which, upon exposure to the air, soon acquires a pink hue, thus reminding of the similar change observable in asafetida.

Portions of the gum were submitted to distillation with and without water. By the latter method a larger amount of volatile oil was obtained, although, owing to the frothing of the heated mass, the entire amount of volatile oil present could not be separated, but the percentage appeared to be relatively small.

The volatile oil was dried by contact with calcium chloride, and then re-distilled. It forms a limpid, colorless liquid, having a char-

<sup>1</sup>The word *gum* is used here in its popular sense, although obviously incorrect from a scientific standpoint.—F. B. P.



acteristic, terebinthinous and rather agreeable odor, and the specific gravity 0.85. Its boiling point is  $160^{\circ}$  C. (the mercury being entirely in the vapor). With iodine it fulminates, and in contact with a mixture of nitric and sulphuric acids it takes fire, thus evidently consisting simply of a terpene  $C_{10}H_{16}$ , as was also indicated by its boiling point. With hydrochloric acid it did not form, however, a crystalline compound, nor could crystals of terpin be obtained therefrom by the usual process. The amount of oil obtained did not suffice for an examination of its optical properties.<sup>1</sup>

The aqueous distillate from the gum, from which the volatile oil had been separated, had an acid reaction and a somewhat acetous odor, but gave no reaction with ferric chloride. It was digested with barium carbonate, and the solution filtered and evaporated, when a white, scale-like residue was obtained. The salt was quite freely soluble in water, and afforded white precipitates with silver nitrate and with basic lead acetate. When mixed with sulphuric acid it gave off the odor of butyric acid, and when this mixture was heated with a little alcohol it developed the very characteristic odor of butyric ether. An estimation of the barium was made, but the salt had absorbed a little carbonic acid, and the percentage of barium found was, therefore, a little less than that of barium butyrate, with which it otherwise appeared to agree.

A portion of the resin was completely exhausted with hot water to ascertain the presence of a bitter principle. The solution so obtained had an acid reaction, and when evaporated to dryness left an amorphous, blackish-brown residue, having a bitter, somewhat acrid and astringent taste. When dissolved in water it afforded a turbid greenish solution, which became clear when heated, but gave no precipitate with tannin.

<sup>1</sup> It is believed that this is the first examination which has been made of the volatile oil obtained from the so-called spruce-gum, and the references to this subject in our literature are very limited. Mr. F. Stearns (AMER. JOURN. PHARM., January, 1859, p. 29) states that "the commercial oils of spruce and hemlock are one and the same thing, and are distilled from the boughs of *Abies canadensis*." The only other notice relating to oil of spruce that I have been able to find occurs as an abstract in AMER. JOURN. PHARM., April, 1844, which has been kindly afforded me by Professor J. M. Maisch. The latter investigation was made by Gottschalk, under Wöhler's supervision, and refers to the oil obtained from the young twigs of *Pinus Abies*, Lin., or the Norway spruce fir. That oil was found to consist of a terpene, boiling at  $160^{\circ}$  C., and afforded likewise no solid compound with hydrochloric acid.—F. B. POWER.

The resin remaining after the distillation of the volatile oil from the so-called gum formed a transparent, amorphous and brittle mass, which was soluble in alcohol, methyl alcohol, ether and chloroform, sparingly in benzol, and insoluble in petroleum ether. When the finely-powdered resin was brought into a boiling solution of potassium or sodium hydrate it readily dissolved, forming a soap-like compound, which separated on cooling, but which was of a much darker color than the corresponding soap prepared from common rosin or colophony. With potassium or sodium carbonates it seemed incapable of dissolving or forming such soap-like compounds.

Several experiments were made with the view of separating a crystallizable acid or other crystallizable principle from the spruce resin, but without success, as may be shown by the following results:

1. A portion of resin of spruce was digested with alcohol of the specific gravity 0.89, in which it was found to be completely soluble, whereas colophony digested with alcohol of this strength readily affords crystals of abietic acid; with alcohol of specific gravity 0.92 a similar result was obtained.

2. The resin was boiled with a solution of caustic soda for the purpose of combining the acid, and the clear solution subsequently precipitated by hydrochloric acid; but the precipitate was entirely devoid of crystalline structure and had simply a resinous appearance.

3. Ten grams of resin were dissolved in alcohol, and the solution precipitated by an alcoholic solution of lead acetate. The resulting precipitate was collected on a filter, washed with alcohol, and afterward suspended in alcohol and decomposed by hydrogen sulphide. The filtrate from the lead sulphide was allowed to evaporate spontaneously, when a reddish-brown, amorphous residue was obtained, corresponding to 14 per cent. of the original resin. It was readily soluble in alcohol, ether and chloroform, but did not crystallize from these solutions. It fused completely at about 100° C.

The filtrate from the lead acetate precipitate was then treated also with hydrogen sulphide in order to remove the excess of lead salt, and filtered. The latter filtrate, upon evaporation, afforded a non-crystallizable residue of a bright reddish-brown color, corresponding to 86 per cent. of the original resin. Its fusing point was about the same as that of the preceding portion. Both of these constituents of the resin, when moistened with a drop of concentrated sulphuric acid, produce a bright purple color, somewhat similar to the strychnine

reaction with sulphuric acid and potassium bichromate, but differing essentially from this by the color being permanent.

By the oxidation of colophony with dilute nitric acid Schröder obtained isophthalic, trimellithic and terebinic acids. By the oxidation of 50 gms. of spruce resin with nitric acid I obtained only picric acid. From the latter the potassium and sodium salts were prepared and obtained in handsome crystals, which explode like gunpowder when heated on platinum-foil.

From the results of this investigation it will be seen that the so-called spruce-gum differs in many respects from the other balsamic exudations of the Coniferæ, which have as yet been chemically examined.—*Contrib. Dep. Phar., Univ. Wisc., 1886, pp. 30-34.*

## INSECTS AND FLOWERS: A QUESTION.<sup>1</sup>

By C. E. MEETKEERKE.

Nearly four years ago a paper was published in *Chamber's Journal*,<sup>2</sup> purporting to give a short summary of the discoveries which had been made up to that time by a great many careful inquirers on the subject of insect agency in the fertilization of flowers. Since then the Knight-Darwin theory, as it is called in Germany, has progressed with such a rush in one direction that a reaction is already setting in, and it is now almost beginning to be doubted, not only if cross-fertilization is necessary to the life of plants, but even if it is particularly advantageous to them.

When Sprengel, Knight, Delpino, Müller, and a host of other writers, asserted that the aid of insects was necessary for the complete fertility of plants, and when Charles Darwin undertook his own practical researches on the subject, little doubt was left upon the minds of unprejudiced people as to the intimate relations existing between the animal and vegetable kingdoms. Darwin was supposed to have freed himself from what were held to be the mistakes of Sprengel and the early investigators, but even he had ventured to affirm the general truth of their conclusions before he had himself engaged in any very critical researches. Some contradictions arose, and it was remarked that the records of botanical literature are

<sup>1</sup> From the *Medical Bulletin*, May.

<sup>2</sup> *Chambers' Journal*, June, 1882.

vitiated by a larger intermixture of falsity and fiction than might be imagined possible in an experimental science.

Sprengel's work was published in 1793, and in 1862 Darwin wrote his "Fertilization of Orchids," which was enthusiastically received, but which gave rise to the well-founded objection that in most orchids the operation of insect visitors was only indirectly concluded from the structure of the flowers.

"Criticisms near the mark or further from the mark, or even altogether far and away from any mark," only led to the conviction that there is much more in the shape of a petal and the position of a plant-hair than was formerly supposed, and that insects do not merely loiter about brilliant blossoms in idle satisfaction or for necessary sustenance, but that they have a mission to increase the beauty and prolong the life of flowers, and it is added that, so well is this mission understood, that flowers, in their turn, learn to distinguish between profitable and unprofitable visitors, and grow to provide special arrangements for allurement or exclusion. This being stated, we must either allow subtle, secret meanings to color, shape, and all the beautiful, familiar things taken once upon a time for granted, as a part of natural development, to be one of the forces in the great heaving life sea, or else reject the whole theory as extravagant and mistaken. Going still further, we are told that it is to insects we owe the beauty of our gardens, the sweetness of our fields, and that to them alone flowers are indebted for their very existence, and when we come to this, the most casual inquirer is led to find out what grounds exist for it, how far it is borne out by evidence, and if we are really bound to accept as truth that, should butterflies, flies, and bees be exterminated, the world would no longer know the beauty of flowers.

Fairly to examine the true Knight-Darwin theory, it will be well to learn from their own words to what conclusions these able men arrived as the result of their researches. We shall then be in a position to remark that the rolling stone of a new doctrine, once set in motion, is never in want of a friendly shove. We see how hasty conclusions are made to harmonize with preconceived ideas and extravagant notions are issued as true coin.

The favorite text of Darwin's interpreters is his much misapprehended maxim, "Nature abhors perpetual self-fertilization;" and, as if foreseeing that such an axiom might lead to mistakes, he defines

his meaning with precision in some introductory remarks to his work on "Cross and Self-Fertilization." These are his words: "In 1862, I summed up my observations on orchids by saying that nature abhors perpetual self-fertilization; if the word perpetual had been omitted, the aphorism would have been false." And in another place: "From my own observations on plants I became convinced, many years ago, that it is a general law of nature that flowers are adapted to be crossed, at least occasionally, by pollen from a distinct plant." This opinion was ratified by Andrew Knight in these words: "In no plant does self-fertilization occur for an unlimited number of generations."

It will be remarked how wide a difference exists between the guarded expressions of these careful inquirers and the rash law-giving of later writers, who, although working on the lines laid down by Darwin, have assuredly studied only the contrivances which are favorable to cross-fertilization, and neglect to make mention of those facts, so weighty and so numerous, which tell so dead against them. They appear to forget that there are many plants whose pollen is wafted away by the wind, and which are wholly independent of insects. That there are great numbers which are propagated by grafts, buds, layers, bulbs, tubers, and cuttings, besides over thirty natural orders of cleistogamic plants, closed to all comers, necessarily self-fertilized.

In 1869 Severin Axell divested some hasty conceptions of their one-sidedness, and, besides the facts just mentioned, he drew out a list of plants in which self-fertilization inevitably takes place, mentioning those also which are aquatic, and which, under ordinary circumstances, expand their flowers at the surface of the water, and are cross-fertilized by the wind, but which remain closed when the water is unusually high, and then fertilize themselves, producing seeds which propagate the species.

Even the history of the orchids, that stronghold of insect agency, tends, from recent observations, to show that intercrossing is not so advantageous as it is supposed to be, since many tropical kinds, cited as especially adapted for intercrossing, are found to an enormous extent utterly barren, whilst several species which exhibit remarkable adaptations for close fertilization produce abundance of seed.

This would appear a startling contradiction to Darwin, until it is recollected that, with his usual candor, he points out the sterility of



many English orchids, and remarks that the bee ophrys is excellently constructed for self-fertilization, and that the fly and spider orchis are never visited by insects.

It is known that a great number of alpine plants grow beyond the height at which they can produce seed, and those growing on mountain pastures generally propagate themselves by bulblets. Many of our own very common plants do not set seed. The horseradish never produces any. The periwinkle spreads largely by runners. The varieties of peas keep true because they are not crossed by insects. The St. John's wort rarely sets seed. Poppies produce plenty of capsules when insects are excluded.

An argument, which may be used either way, is adduced by Darwin, whilst insisting on the greater size and vigor of the offspring of crossed flowers. "It might have been expected," he says, "that the seedlings from plants, the flowers of which were excessively sterile, would have profited in a greater degree by a cross than the seedlings from plants which were moderately or fully self-fertile, and, therefore, had no need to be crossed; but no such results followed." He also admits that there are no signs of degeneracy in the bee or other self-fertilized orchids, and that they are all vigorous growers.

The assertion that brilliant hues and full cups are designed as allurements to insects is abundantly contradicted by foreign botanists, who describe plants with conspicuously beautiful flowers, which are as much adapted to secure self-fertilization as others are for crossing, and many of our own native flowers, secreting much nectar and producing much pollen, are wholly disregarded by butterflies, flies, and bees.

That color variation is wholly attributable to insects is exceedingly doubtful, and that all the brilliant colors descended from the primeval yellow are due to their selective agency is so evidently a fallacious doctrine that very few words will be required to refute it. The doctrine is this: that the colors of flowers are intended to attract insects, and that certain colors are definitely intended to attract certain kinds of insects.

That flowers which lay themselves open for fertilization by miscellaneous small flies are white; those which depend on beetles are yellow. Butterflies prefer red, lilac or blue; and bees blue; blue flowers being, as a rule, specialized for fertilization by bees.

One of our recent poetic botanists asserts that, as the bee flowers grew bluer, the bees must have grown fonder and fonder of blue, and, as they grew fonder of blue, they must have more and more constantly preferred the bluest flowers.

Thus the special tastes of insects are supposed to be the selective agency for developing, white, pink, red, purple, and blue petals from the original yellow ones. But, we cannot help asking how could insects exercise any selective agency unless the petals had first shown any tendency to vary? We find no satisfactory answer to this question; but we have the following facts before us, which speak for themselves:

The pigments of colored petals are stored in the ordinary tissues of the plant, and a very small number is required to produce a seemingly endless variety.

The colored substances are in many cases the same as those left in the foliage from which chlorophyll has disappeared; so that bright petals are often exactly like leaves which have turned yellow and red in autumn, or the very red and yellow leaves of early spring.

White, which is the dress of so many flowers, is due simply to the reflection of light through colorless air-filled cells and tissues.

Black spots on flower or seeds, as, for example, on the garden bean, owe their origin merely to a concentration of dense violet pigment; and the blackness of so many berries is produced in the same way, by violet thickly heaped on in patches, which become, therefore, impenetrable to light. The apparently black berries of deadly nightshade contain a splendid violet, easily soluble in water and alcohol; with acid it becomes a purplish-red, and with ammonia, green. Setting aside chlorophyll green, which is only exceptionally a flower color, the remaining pigments are yellow, red, and blue; the two latter exist in the cell sap. Yellow is identical with the substance which, in the animal kingdom, goes under the name of lipochrome; and the color of the rind of an orange is due to the same pigment as is found in the yellow of the buttercup. It is only a denser deposit of it. The red of roses, pinks, and poppies, is due to a single pigment; it is just a matter of difference in intensity. It may be affected by the presence of an acid in the cells, and, sometimes, by the addition of a small quantity of lipochrome; not that a mixture of the two colors takes place in the cells, but that rose-red

in the sap and yellow in the protoplasm, found together in scarlet flowers, present just such a combination to our eyes, as when we set a red glass and a yellow one side by side, we see before us a mixture of the two colors.

By diminishing exposure to light, a complete alteration can be produced in the relative amount of coloring matter, although no invariable rule can be laid down as to its influence, since some flowers retain their color in darkness, whilst others lose it. Indeed, it has been affirmed that flowers produce their intensest colors in the dark, even if the whole plant is kept in the dark, but in such cases there can be no production of chlorophyll green. It may be mentioned that chlorophyll green is always accompanied by chlorophyll yellow, which is much less sensitive to light, and remains after the disappearance of the green.

It is well known that the soil has an immense influence on color, insomuch that many variations can be produced at will, and the mere transplantation of a plant will alter its color. Much care has to be taken as to the material in which tulips and other florist's flowers are grown, since if they should be too highly nourished they are apt to lose their distinctive stripes, to which they owe their marketable value. These brilliant stripes are due to bad variation, and it may be noticed incidentally that when branches become variegated by bad variation, and the variety is attempted to be propagated by seed, the seedlings are rarely variegated. But variation is much surer and more powerful than any change that can be effected by the crossing of flowers. Even a leaf inserted by its footstalk into the bark of the stock is sufficient to communicate variation to it, although the leaf soon perishes. Gärbner relates that branches of white and dark-fruited vines, which were split longitudinally, and then joined, produced distinct bunches of grapes of the two colors, and other bunches with berries either striped or of an intermediate or new tint. Darwin alludes to this, and observes, "These facts are the more remarkable because Andrew Knight never succeeded in raising variegated grapes by fertilizing white kinds by pollen of dark kinds." He also draws from this and similar cases the highly important physiological fact that the elements which go to the production of a new being are not necessarily formed by the male and female organs. They are present in the cellular tissue in such a state that they can unite without such aid.

That insects, attracted by conspicuous petals, or from a distance by scent, always presupposing that they are possessed of similar organs to our own, may have influence in the maintenance of colored species is not denied, for that would be to impair the rational doctrine of the survival of the fittest.

The cultivator who carries out a like selection corroborates its wisdom, but he does not depend alone on choice, and is well aware that he must make use of the many other means to attain his end. It is quite admitted that to the horticulturist the value of intercrossing is great. He may obtain finer flowers, to fetch a higher price, but it is much more than doubtful if, in the bare struggle for existence, the help of insects is indispensable; on the contrary, such absolute dependence on external agency must naturally be as much a source of hindrance as a want of self-reliance is to a man who desires to get on in his struggle for life.

The question is this: Is cross-fertilization actually necessary for the perpetuation of plants, or is it even so desirable as we are told that it is, and is color in flowers a mere expedient for getting themselves cross-fertilized? We know that brilliant hues undoubtedly exist, when, so far as we can see, they confer no benefit on their possessor; that some flowers are at their brightest when fertilization is over, and that there are large families which are wholly independent of insects, and yet show no signs of degeneration or extinction.

There is still another question: Is the development of beauty of no account in the plan of the universe? It is now distinctly stated that gay colors in fruit and flowers serve solely as guides to birds and beasts, in order that the fruit may be devoured and the seeds disseminated, and that it is a fallacious opinion that mere beauty and variety are objects in nature; but if such be the case, we must also give a reason for the rich attire of clouds, the harmonies of woodland shades, the sparkle of the streams, no less than for "the flower-inwoven mantle of the earth."

These utilitarian theorists, however, have not yet taken all the world by storm; there still exist careful observers who do not hesitate to believe in "Uselessness divinest of a use the finest," who see that the veil is not yet lifted, and who acknowledge that the greatest wizard is the man who best knows the secrets of the vegetable world.  
—*Phar. Jour. and Trans.*, June 5, 1886.

## ON STROPHANTHUS, A HEART-POISON.

The pharmacological action of this poisonous African plant was mentioned by Pélikan, of St. Petersburg, in a brief communication to the Academy of Sciences of Paris, in 1865, and in the same year by Drs. Hilton Fagge and Gallois in a note appended to a paper on heart poisons. Prof. T. R. Fraser in the Proceedings of the Royal Society of Edinburgh, 1869, communicated the results of the chemical composition and of the action of the drug, and in 1877 Hardy and Gallois (See AM. JOUR. PHAR., 1877, p. 402) described some of the properties of the crystalline principle isolated by Fraser, and named it *strophantin*. In a paper read before the British Medical Association in 1885, Fraser stated that this crystalline body has a strongly bitter taste, a feeble acid reaction, is readily soluble in water and in rectified spirit, practically insoluble in ether, benzol and benzin, not precipitated by the ordinary reagents for alkaloids, free from nitrogen, and when heated with dilute sulphuric acid yields glucose and *strophantidin*, which is insoluble in water, very soluble in alcohol and has a strongly bitter taste. Strophantin is obtained from the alcoholic extract of the seed by dissolving in water, washing the solution with ether and evaporating the liquid at a low temperature. The seeds contain from 8 to 10 per cent. of strophantin and smaller proportions are present in the leaves and bark of the plant.

In the same paper referred to before, Prof. Fraser gives the results of his observations on the action of strophantin which is the same as that of the seeds. A *tincture of strophanthus* was prepared from 2½ ounces of the powdered seeds and 2 pints (imperial) of rectified spirit, and occasionally the fat abundantly present in the seeds, was previously removed with ether. The tincture was given in doses of from 4 to 20 minims, twice or three times daily, and strophantin was injected subcutaneously, the quantity being 1-50 grain. In the latter case the beneficial influence upon the circulation of a single injection was ascertained to persist for eight days at least. Comparative experiments made upon the separated frog-heart showed that solutions of *digitalin* (made by Morson) of 1 part in from 100,000 to 4000 parts produced characteristic changes in the heart's action, but were not sufficiently strong to kill the heart within two hours; and that a solution of *strophantin*, 1 in 6,000,000, produced characteristic changes in the heart's action, and complete stoppage of the contractions in extreme



systole in about 20 minutes. In a frog whose central nervous system had been destroyed, a solution of digitalin, 1 in 20,000, passed through the blood vessels produced in 6 or 7 minutes extreme contraction of the vessels; but no decided effect was observed with strophanthin in solution 1 in 3000, and a temporary effect merely with a solution 1 in 2,000. *Strophanthus*, therefore, exerts a much more powerful action upon the heart, and a less powerful action upon the blood vessels than digitalis.

The *Kombé* arrow poison, in some places also called *inée*, *onage* or *onaie*, is supposed to be derived from *Strophanthus hispidus*, *DeCand.*, or from *St. Kombe*, *Oliver*, described in *Icones Plantarum*, Nov. 4, 1870. Some of the seeds supplied to Prof. Fraser from the Shiri valley, near Lake Nyassa, were sown in the Royal Botanic Gardens, Edinburgh, and the plants were shown by Mr. E. M. Holmes (*Phar. Jour. and Trans.*, March 13, 1886), to differ from both the above species. In the fruit of *St. hispidus*, collected in Dr. Baikie's Niger Expedition and preserved in Daniel Hanbury's collection, the naked portion of the awn above the seed is about one inch in length, and the hairs on the seed are of a brown color. A specimen from Messrs. Burroughs and Wellcome consists of striated and smooth follicles, the latter believed by Mr. Wellcome to have been scraped; the seeds in both are alike, are rather larger than those of *St. hispidus*, with paler hairs, and with the naked portion of the awn nearly two inches in length. Apparently identical with this is a specimen from Rev. H. Waller, while a fourth specimen from Mr. H. B. Moir, is a much shorter follicle with seeds having pale hairs and an awn, the naked portion of which is one inch long. Therefore, two forms of pods and seeds come from the district between Zanzibar and Lake Nyassa; both differ from *St. hispidus*, and it is uncertain whether one of them may be derived from *Strophanthus Kombe*. If *St. hispidus* should be found to have the same therapeutical value as the one experimented with by Prof. Fraser it could probably be more readily and cheaply obtained from Sierra Leone, than the species from Eastern Africa. The latter is procurable only at a very extravagant cost, as we have been informed by Messrs. Burroughs, Wellcome & Co., to which firm we are indebted for specimens of this drug, which they are at present offering in the form of tincture put up in  $\frac{1}{2}$  oz. vials. This, we believe, is the only form in which the new remedy is as yet to be had in the American market.

J. M. M.

## GLEANINGS IN MATERIA MEDICA.

BY THE EDITOR.

*Quinine Hydrates.*—The only crystallized quinine hydrate now known is prepared by Prof. Flückiger (*Phar. Jour. and Trans.*, April 24, 1886, p. 897) by adding ammonia to an aqueous solution of the officinal quinine sulphate saturated at about 15° C. (59° F.) until the precipitate is redissolved; after some days fine tufts of crystals make their appearance, which at 120° C. (248° F.) lose 14.24 per cent., or 3 molecules, of water. By precipitating the same quinine solution with just sufficient ammonia water, an *amorphous* hydrate of the same composition is obtained. An amorphous hydrate with 2 H<sub>2</sub>O (10.13 per cent.) is precipitated by ammonia from a concentrated solution of quinine sulphate prepared with the aid of sulphuric acid. The existence of Fletcher's monohydrate seems to be doubtful. A hydrate with 8 H<sub>2</sub>O was prepared by Hanamann in 1863, and one with 9 H<sub>2</sub>O by Oudemans in 1873. The benzol compound (C<sub>20</sub>H<sub>24</sub>N<sub>2</sub>O<sub>2</sub>)<sub>2</sub> + C<sub>6</sub>H<sub>6</sub> + 2 OH<sub>2</sub>, described by Wood and Barret in 1883, has also been obtained by Flückiger.

*Labdanum of Cyprus.*—W. T. Thiselton Dyer procured from H. L. Thompson, the Commissioner of Papho, for the Kew Museum the instrument used for the collection of labdanum, and which is substantially the same as the Cretan ladanisterion, though differing in some slight details as to form, and having strings instead of leather thongs. —*Phar. Jour.*, 1886.

*Minnesota Opium.*—During the year 1885 Emil Weschcke experimented on the cultivation of different species of Papaver at New Ulm, Minn., and from the unripe capsules of *P. somniferum* prepared a quantity of opium which, in the air-dry condition, contained 2.8 per cent. of moisture, and, after drying, yielded 15.230 per cent. of morphine, 0.325 per cent. of narcotine, 0.416 of codeine and 3.500 per cent. of meconic acid. The author does not believe that the cultivation of the poppy for the production of opium in this country would be attended with profit.—*Contrib. Dep. Phar., Univ. Wisc.*, 1886, pp. 10–18.

*Yellow Opium Mold.*—Prof. Wm. Trelease examined the bright yellow fungus which is sometimes observed on opium. It is the *Eurotium herbariorum*, *Link*, and this was shown in 1854 by DeBary to be the ascosporic fruit of one of the common green molds, *Asper-*

gillus glaucus, *Lk.*, and has therefore been named *Erotium Aspergillus-glaucus Lk.* The paper is accompanied by drawings of the fruiting parts.—*Ibid*, pp. 4-9.

*Reactions of Fixed Oils.*—Thos. Maben (*Phar. Jour. and Trans.*, March 20, 1886, pp. 797-800) obtained from the Indian collection at the Forestry Exhibition in Edinburgh, samples of the oils of apricot (*Prunus Armeniaca*), peach (*Prunus Persica*) and walnut (*Juglans regia*), and compared their reactions with those of oil of almond. The test with *nitric acid* was applied by shaking vigorously together two fluid drachms each of the oil and pure nitric acid, sp. gr. 1.42, and noting the color at the end of five minutes, an hour, and five hours. For the *sulphuric acid* test, 10 drops of the oil are placed on a white tile, and 2 drops of strong sulphuric acid are dropped in the centre of the oil. The *chloride of zinc* test is applied in the same manner, but 5 drops of the reagent are used, and this is prepared by making a saturated solution of oxide of zinc in strong hydrochloric acid. In the following table, walnut oil alone is a drying oil.

	<i>Apricot Oil.</i>	<i>Peach Oil.</i>	<i>Almond Oil.</i>	<i>Walnut Oil.</i>
Specific gravity at 60° F.....	.9204	.9232	.918	.9264
Freezing point....	-20° C., slightly viscid.	-20° C., slightly viscid.	-20° C. (-21.5°), opaque and viscid.	-20° C. (-27.5°), viscid & slightly opaque.
Saponification: 1000 parts require.....	181.4 KHO	189.1 KHO.	183.0 KHO.	194.4 KHO.
Bromine absorbed by 100 parts of oil.....	70.0	77.0	53.74	90.5
Nitric acid.....	Coffee-brown.	Dark brown.	Action slight.	Dark brown.
Sulphuric acid.....	Light brown to red brown.	Dark brown.	Yellow to orange.	Dark brown to purple.
Chloride of zinc...	Muddy brown with shade of purple.	Purple brown.	No action.	Muddy brown.
Elaidin test.....	Light yellow, hard.	Citron yellow, soft.	White, hard.	Does not solidify.

*Products of Maize.*—A brief notice was given in this Journal, 1885, page 404, of a process elaborated by Dr. F. V. Greene, U.S.N., for extracting the oil and albuminoid matter from corn. The Franklin Institute has recently awarded the John Scott Legacy Medal for this process, by which the waste products of starch works and other industries may be utilized.

*Anchusa tinctoria*, Lin.—Four samples of alkanet root were tested by C. J. S. Thompson (*Phar. Jour. and Trans.*, April 10, 1886, p. 860) for the amount of anchusin, by following Pelletier's process, the root being exhausted with ether. The coloring matter varied between 5.25 and 6.02 per cent. It is red, resin-like, insoluble in water, soluble in oils, alcohol, chloroform and ether, and with a rich, deep-blue color in alkali hydrates, the color changing again to crimson on the addition of an acid. The author regards anchusin as being quite as delicate a test as litmus.

*Iringia Oliveri*, Pierre; *Simarubaceæ*.—Mr. J. B. Vignoli obtained in 1880 a specimen of *cay-cay wax*, which is a product of the above-named tree, according to Mr. Pierre, director of the botanic garden at Saigon. Mr. Vignoli (Thèse, Montpellier, 1886,) gives a full botanical description of the tree, which is common in the forests of eastern Cochinchina, and has also examined the anatomical structure of the branches, leaves and fruit. The fruit is an ovoid yellow drupe, of the size of a lemon and with a fibrous mesocarp, and contains a seed of the size of an almond, having a brown, smooth and brittle testa, and containing a large embryo and a small quantity of albumen. For preparing the fat, the seeds are exposed by the natives to the sun for some time, then bruised, exposed to steam and then expressed, the yield being about 20 per cent. of the fresh seeds. The dried seeds weigh on the average 0.7 gm., and on being treated with carbon disulphide yield 52 per cent. of fat.

The cakes of *cay-cay wax* are usually in the form of truncated cones, weighing about 2.5 kilos. It is of a grayish-yellow color, unctuous to the touch, and has a peculiar odor, becoming stronger and disagreeable when heated. It is readily soluble in ether and carbon disulphide, also in hot alcohol, but dissolves sparingly in cold alcohol. At 37° C. it becomes soft, melts at 38°, and solidifies again at 34°. It is easily saponified, and yields 68.7 per cent. of fatty acids, 30.2 of which is oleic acid, the remaining acids being probably stearic, and several of those liquid at the ordinary temperature.

*Cay-cay wax* is only used for candles by the natives, bamboo joints being the moulds. These candles give a light somewhat inferior to that of stearin candles, and when burning do not give off a disagreeable odor.

*Horse-chestnut Leaves*.—The *Sapindacæ* being botanically closely related to the *Erythroxylacæ*, it was deemed of interest to ascertain

whether the leaves of *Æsculus Hippocastanum*, *Lin.*, contain cocaine or an alkaloid having analogous properties. F. O. Ray treated the leaves according to the improved process of Dr. Squibb for the assay of coca leaves (*Ephemeris* II, 784, May, 1885), and also according to the process recommended by Dr. A. B. Lyons (*AM. JOUR. PHAR.*, 1885, p. 466), but without obtaining any decided reaction for an alkaloid. Other experiments, made for the purpose of determining the presence of a volatile alkaloid, of a volatile acid, or of caffeine (which is present in the seeds of *Paullinia sorbilis*, *Martius*), gave likewise negative results, and it was ascertained that *æsculin*, which is abundantly contained in the bark of the horsechestnut, is apparently entirely wanting in the leaves.

Gehe & Co. (*Phar. Zeitung*, 1885, No. 78) obtained from horsechestnut leaves traces of a volatile liquid alkaloid, colored red by sulphuric acid, and probably identical with a similar substance contained in coca leaves.—*Contrib. Dep. Phar., Univ. Wisc.*, 1886, pp. 27, 28.

*The Leaves of Acer dasycarpum*, *Ehrhart*, the white or silver maple, were examined by Emil Weschcke, the results being quite analogous to the foregoing. Traces of a substance were found affording reactions similar to those of alkaloids; and ether extracted from alkaline solutions a very small amount of a neutral crystallizable principle, which was not further examined.—*Ibid*, p. 29.

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### APPRENTICE EXAMINATIONS.

At the meeting of the Board of Trustees of the Philadelphia College of Pharmacy, held February 2d, 1886, the following remarks were made by Wallace Procter :

"The subject of preliminary examination of the applicants for tuition in the college, has from time to time come before the Board for discussion and action. In my opinion, the present method dividing the inquiry into the capacity of the student into three parts, eligibility for the final examination depending on his success at those preceding it, is the best yet devised. The test scholarship is strictly applied, while the ability of the pupil to profit by didactic teaching, illustration and the accompanying necessary study is fully tested.

Now we know that many who present themselves for the technical teaching of a school of pharmacy, are deficient in the primary knowledge, so essential to the successful prosecution of the study of the higher branches of scientific knowledge taught therein.

Now what is the remedy for this? And how can it be applied?

To me it seems that the responsibility lies with the master or employer who first takes the green hand and attempts to fashion him into a pharmacist. He



would not attempt to build a house without a foundation! Why should he expect to form an accomplished druggist without some investigation of the fundamental acquirements of the applicant for instruction. If deficient in the ordinary branches of an English education, his orthography bad, syntax worse and the mysteries of the rule of three a sealed book to him, how can he be expected to do justice either to himself or to his instructor? It is unfair to the young man to encourage him to undertake the difficult but necessary curriculum of a college of pharmacy, if he has not arrived at a point which will render earnest and effective study possible.

It will be said that the employer himself should thoroughly test the applicant's fitness and knowledge before receiving him as an apprentice. Very true, but how many have the time, the inclination, or sometimes even the readily available ability to arrive at the desired conclusion.

Now, I would suggest that this might be accomplished under the auspices of this college, in a manner which would be satisfactory to all concerned.

Let there be held in the college building at stated periods, either monthly or bi-monthly, an examination. Let it be conducted either by the Committee on Examination, or a special Committee for the purpose; let it consist of questions in geography, elementary grammar, arithmetic and composition; orthography and chiography to be estimated therewith.

The results communicated to the applicant, if favorable, to be simply a statement that, in the judgment of the Committee, he is sufficiently advanced to enter a drug store. If unfavorable, no publicity should be given to the fact. Let there be a record kept by the actuary of all who have passed, open to the inspection of employers.

It would probably be advisable to exact a nominal fee, though this would be a subject for consideration.

If such a plan should be adopted, the young man, before seeking a situation, could be examined, or the prospective employer could insist on his passing before considering his application further.

In this way, members and others, without trouble to themselves, might be assured that their apprentices had, at least, the ground-work on which to build, and could proceed to impart technical knowledge with much greater prospect of satisfactory progress. I would suggest that a committee be appointed to consider the matter and elaborate a plan for its practical application."

A committee, consisting of Wallace Procter, William J. Jenks, Alonzo Robbins, Wm. B. Thompson and Daniel S. Jones, was appointed to report on the advisability of the adoption of the above suggestions. This was presented at the April meeting of the Board, and was adopted. It favored the appointment of a committee to carry the plan into effect at the earliest period, deemed advisable. This Committee consists of Messrs. Wm. B. Webb, chairman; W. Procter, Wm. B. Thompson, Dr. A. W. Miller and Gustavus Pile. This Committee has, after a number of meetings, formulated rules for its guidance, determined the scope of the examinations, and adopted the title which heads the foregoing. The first "Apprentice Examination" will be held Wednesday, September 15th, at 3 p. m., in the Museum of the College. It will consist of questions in elementary grammar, geography, arithmetic,

not further than simple proportion, and a composition on some specified subject. Application must be made to the Actuary, Thos. S. Wiegand, at least one week prior to that date, a fee of two dollars to be deposited at the time which will be returned in case of failure to pass. The record of successful applicants will be made as full as possible, embracing all information obtainable that will be of probable use to employers in search of assistants. The existence of such a register will be of material aid to those desiring properly qualified apprentices, and would become the recognized means of bringing together the employer and his juniors. It is earnestly desired that members of the College and all others interested in the advancement of our profession should avail themselves of these efforts in their behalf, and make the possession of the Apprentice Examination Certificate a necessity to entrance into their stores, unless they are fully satisfied that the applicant has the requisite foundation. Young men desiring to enter upon the study of pharmacy will find in this certificate a pass-port of available value in their search for employment, and there is no room for doubt that rejections for defective scholarship at the Junior examinations would be materially lessened in number and the standard raised.

By order of Committee,

WALLACE PROCTER, *Secretary.*

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## MINUTES OF THE COLLEGE MEETING.

PHILADELPHIA, JUNE 28, 1886.

A stated meeting of the members of the College was held this day, in the hall, 145 N. 10th street, at 3.30 p.m., seventeen members present, Chas. Bullock presiding. The minutes of the previous stated meeting were read and adopted. The minutes of the Board of Trustees for April, May and June were read and accepted.

The report of the delegates to the meeting of the Pennsylvania Pharmaceutical Association, held at Lebanon, was not formally presented. Mr. Alonzo Robbins, however, made a verbal statement, noting, among other facts, the resolution of the State Association to meet in Philadelphia, June, 1887. Mr. W. J. Jenks moved that the rooms of the College be placed at the disposal of the State Association, and that that body be invited to occupy them. Motion adopted.

The application of Mr. Thos. H. Franklin, of Philadelphia, for membership in the College was presented by the Secretary, and, on motion, referred to the following as Committee: Jos. P. Bolton, Thos. S. Wiegand and William B. Webb.

Prof. Maisch read a communication from M. P. Dorveaux, Librarian of the "Ecole Supérieure de Pharmacie de Paris," acknowledging receipt of volumes of the AMERICAN JOURNAL OF PHARMACY contributed by this College to the library of that institution.

On motion to elect delegates to the next session of the American Pharmaceutical Association, which meets at Providence, R. I., in September, the following gentlemen were nominated: Alonzo Robbins, Robt. England, Gustavus Pile, Edward C. Jones and Henry Trimble. On motion of Mr. W. E. Krewson,

Mr. T. S. Wiegand was directed to cast ballot for these gentlemen, which being done affirmatively, they were declared duly elected.

Mr. W. J. Jenks moved the election of a *Curator*, in place made vacant by decease of Mr. C. F. Zeller, and nominated Mr. Jos. W. England. Mr. W. E. Krewson moved that an affirmative ballot be cast by Mr. T. S. Wiegand—this was formally done, and Mr. England declared elected.

A motion to adjourn being suggested, the same was made and carried.

W. B. THOMPSON, *Secretary*.

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## EDITORIAL DEPARTMENT.

*Potatoes*.—We are indebted to Mr. W. B. Brownscomb, of Richmond, Victoria, Australia, for a communication on the results of the experimental culture of *Solanum tuberosum*, var. *boreale*, of which we were enabled in the latter part of 1884, to send a few tubers to Mr. Jos. Bosisto. Two tubers weighing 30 grains, were planted Feb. 20, 1885, the first crop in August yielding tubers weighing 7 dwt. On November 4th these were again planted, and on March 10th last, they were lifted, the result being 18 oz. The plants have flowered and seeded profusely, and it is calculated that next season the yield will be 4 to 5 cwt. The tubers received from the second Australian crop are being cared for by Mr. G. W. Kennedy, of Pottsville, while the same variety, the remnants of our unsuccessful culture, together with the specimens of *Solanum Maglia*, received from Messrs. Sutton & Sons, Reading, England, are in the care of Mr. J. H. Redsecker, Lebanon, Pa.

*Deserved Honor*.—At the commencement held June 30th, the regents of the University of Michigan conferred the degree of Doctor of Philosophy, *honoris causa*, upon Professor Albert B. Prescott, M.D., director of the chemical laboratory, and dean of the school of pharmacy at Ann Arbor.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*Gray's Botanical Text-book*, Sixth Edition, Vol. II. *Physiological Botany*. By George L. Goodale, A.M., M.D., Professor of Botany in Harvard University. New York and Chicago: Ivison, Blakeman, Taylor & Co. 8vo, pp. 499. Price, \$2.00.

The fifth edition of Prof. Gray's *Structural and Systematic Botany* was issued in 1857. Since then many new and important observations and discoveries have been made in botany, and when about six years ago a new edition was announced, it was found that the new facts and the general scope of the science, as developed by the modern researches, were such as to render a division of the former work desirable. The first volume of the sixth edition, which then made its appearance, was confined to the morphological structure and development of plant organs, and to the general principles of classification and plant description. During the past winter the second volume, written by Prof. Goodale, was published, and is now before us.

The volume is divided into two parts, of which the first one treats of the

histology of phænogamous plants, with an introductory chapter on microscopes, dissecting instruments and other appliances necessary or useful in prosecuting the study of vegetable anatomy. Next is considered the cell, comprising structure, composition and principal contents; and this is followed by a chapter on the modifications and kinds of cells and the tissues they compose. The following chapters are devoted to the consideration of the anatomy and development of the different plant organs, root, stem, leaf, flower, and of the fruit and seed; and conclude with a brief physiological classification of tissues.

The second part of the volume treats of vegetable physiology, commencing with protoplasm in its various relations, and proceeding to the absorption and diffusion of liquids, to the different soils, to the transfer of water and transpiration, to assimilation, to the changes of organic matter, and to vegetable growth, the latter including the division and growth of cells with its conditions and effects under various influences. The remaining chapters treat of the movements of plant organs, of the process of reproduction, of the ripening and germination of seeds, and of the resistance of plants to untoward influences, such as heat, cold, light, poisons, etc.

The brief outline here given shows that the volume aims at giving a complete exposition of the phenomena of plant life, its conditions, processes and results; and on examining the different chapters, it will be readily noticed that the voluminous material—new and old—has been arranged and handled in a comprehensive and attractive manner, rendering it pleasing to the attentive student. The numerous good woodcuts, over 200 in number, add considerably to the value of the work.

The greater portion of Prof. Goodale's work is directly applicable to the botanical studies of the pharmaceutical student, and supplements the first volume, Prof. Gray's organography. Both subjects being indispensable adjuncts of the study of vegetable materia medica, the sixth edition of the "Botanical Textbook" should be found in the library of the pharmacist, whose aims reach beyond the mere superficial knowledge of the character and nature of the drugs of vegetable origin.

It should be mentioned yet that to the second volume has been added "suggestions for studies in histology and physiology of phænogams," which will be found of great value to the beginner as well as the advanced student.

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*General Index to the Year-book of Pharmacy* for the years 1864 to 1885 inclusive. London: Published for the British Pharmaceutical Conference by J. & A. Churchill. 1886. 8vo, pp. 246.

This very acceptable publication renders available the material contained in the twenty-two issues of "Proceedings" and "Year-book" thus far published by the British Pharmaceutical Conference.

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*Practical and Analytical Chemistry*, being a complete course in chemical analysis. By Henry Trimble, Ph.G., Professor of Analytical Chemistry in the Philadelphia College of Pharmacy. Second edition, revised, enlarged, and illustrated. Philadelphia: P. Blakiston, Son & Co. 1886. 8vo, pp. 110.

The first edition of this work was noticed in detail in the Journal for September, 1885. The necessity of issuing a second edition within the first year

shows that the work has been favorably received. In the present edition, equations have been added in explanation of the reactions of reagents with salts, and the acids have been arranged in three groups, two for the inorganic and one for the organic acids. The study of the latter is a source of difficulty to the beginner, more so than that of the bases; a systematic arrangement of the former is desirable, and may, we think, be carried further with advantage to the student in laboratory work.

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*Laboratory Calculations and Specific Gravity Tables.* By John S. Adriance, A.B., Fellow of the Chemical Society. New York: John Wiley & Sons. 1886. pp. 71. Price, bound, interleaved, \$1.00.

The book contains a number of tables, which are useful in laboratory work as substitutes for laborious calculations. The selection of the tables appears to have been judiciously made of such which are likely to be frequently used. The calculations of percentage composition, conversion factors, etc., have been based on the atomic weights as lately determined by Prof. F. W. Clarke.

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*Proceedings of the Fifth Annual Meeting of the Nebraska State Pharmaceutical Association*, held at Omaha, May 11 to 13, 1886. 8vo, pp. 83.

For a brief account of this meeting see July number, p. 361.

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*Report on Agricultural Colleges and Experimental Farm Stations*, with suggestions relating to experimental agriculture in Canada. By Prof. William Saunders, F.R.S.C. Ottawa. 1886. 8vo, pp. 80.

This has been printed as part of the report of the Minister of Agriculture for 1885.

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*The Merchants' Legal Hand-book.* By Emerson Bennett, Jr., and George D. Domsler, Attorneys, etc. Philadelphia. 1886. pp. 32.

There having been no general revision of the Pennsylvania laws since 1836, this pamphlet has been prepared with the object of giving a brief synopsis of the laws relating to the collection of debts, estate of deceased, deeds, mortgages, mechanics' liens, partnership and others.

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*Zur Erinnerung an Scheele ein Jahrhundert nach seinem Ableben.* Von F. A. Flückiger, 8vo, pp. 50.

In remembrance of Scheele a century after his death.

This valuable memoir is a reprint from *Archiv der Pharmacie*.

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*Ueber die Halogenadditionsprodukte der Propylchinolinhalogenüre und ein daraus gewonnenes Monobromchinolin.* Von Friedr. Collischonn. Freiburg, Baden. 1886. 8vo, pp. 69.

On the halogen-addition-products of the propylquinoline halogen compounds, and on a monobromquinoline obtained therefrom.

An inaugural dissertation for the degree of doctor of philosophy.

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*Bulletin of the North Carolina Board of Health.* Nos. 2, 3.

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*The Relation of the State and the Medical Profession.* Address before the Alumni Association of the University of Michigan. By Chas. J. Lundy, A.M., M.D. pp. 12.



*Homœopathy as viewed by a Member of the Massachusetts Medical Society.* Address before the Hahnemann Society, etc., by V. Y. Bowditch, A.B., M.D. Pp. 29. Reprint from the *Boston Med. and Surgical Journal*.

*Erysipelas and other Septic and Infectious Diseases incident to Injuries and Surgical Operations prevented by a method of Atmospheric Purification.* By David Prince, M.D., Jacksonville, Ill. Reprint from the *Amer. Practitioner and News*.

*An Accidental Divulsion of a Pterygium leading to an Improvement in the Regular Operation.* By A. E. Prince, M.D., Jacksonville, Ill. From *Archives of Ophthalmology*.

*Ichthyol und Resorcin als Repräsentanten der Gruppe reduzierender Heilmittel.* Von Dr. P. G. Unna. Hamburg und Leipzig: Leopold Voss. 1886. 8vo, pp. 85. Price, mark 1'60.

Ichthyol and resorcin as representatives of the group of reducing remedies.

## OBITUARY.

Dr. Otto A. Ziurek died in Berlin May 11th, aged 65 years. He was a pharmacist, but devoted his time to analytical chemistry, and more particularly to the analysis and valuation of technical products and of articles of food. For many years he was one of the most competent official chemical experts of Prussia. He was the author of a "Hand-book of Pharmacy" and of several other valuable treatises.

Dr. Julius A. Stoeckhardt died in Tharand, near Dresden, June 1st, in the 77th year of his age. He was a pharmacist, but for nearly fifty years taught chemistry, and was, since 1847, professor of chemistry at the Agricultural Institute of Tharand, acting also as inspector of pharmacies of Saxony. He was the author of numerous essays on agricultural subjects, and of the "Schule der Chemie," a work which was translated into several languages, and passed through nineteen editions in Germany within 40 years.

Prof. Chas. Froebel died of erysipelas in New York, June 19th last, at the age of 50 years. He was a native of Germany, and came to this country at the age of 13 years, with his father, Julius Froebel, who is well known as an author. After completing his elementary education, Charles Froebel studied natural history at Freiburg, and continued his chemical studies under Prof. Genth, of Philadelphia. In 1873 he became Professor of Analytical Chemistry at the New York College of Pharmacy, which chair he vacated a few years ago. Since that time he was mostly engaged in literary labors.

William C. Gill, Ph.G., class 1873, died in this city, June 22d, of pneumonic phthisis, aged 34 years. For some years he was engaged in business in the northern part of Philadelphia.

Asher C. Nagle, Ph.G., class 1881, engaged in business at Youngstown, O., died at his former home at Heckertown, near Easton, Pa., on June 18th, aged 28 years.